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New Advertisements.

In the growth of THE ELECTRICAL WORLD in circulation, size and general improvement, the value of its columns for reaching those engaged in electrical pursuits or interested in electrical matters has not failed to be appreciated by advertisers. Readers will find it to their advantage to keep their eyes on the advertising as well as the reading columns. The following are the new advertisements in this issue:

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Vol. VIII. NEW YORK, OCT. 9, 1886. No. 15.

LAST week we had occasion again to call attention to the eagerness with which gas companies all over the country are going into the supply of electric light. The tendency is not less observable in Europe than here. Thus the new plant in Rome, of which mention is made elsewhere in our columns, has been put in by the local gas company. The electric light is apparently no longer "sacrilegious."

Is New England becoming a land of lotos eaters? One of the residents in a Massachusetts town where it is proposed to build a street railway and to operate it by electricity, objects, on the ground that the town is "a place of peaceful rest, and he did not think it needed a street railroad." It is really a pity to disturb anybody so lapped in laziness of a sweet content with things as they are, but we are afraid it must be done.

IN a paper read before the British Association describing the electric light plant installed in a colliery, Mr. Sopwith draws attention to the fact that the cost of conductors is practically nil, as the iron and steel cables which are no longer fit for use in the pits may be used as main and branch conductors. Taking this in conjunction with the fact that slack coal costs practically nothing at the mine, colliery lighting ought to make rapid advances.

EMPLOYING the Wollaston method of producing fine platinum wire, as a basis, a Scotch inventor has applied it to the manufacture of carbon filaments for incandescent lamps. This method appears to possess considerable novelty, and if all that is claimed for it by its inventor can be relied upon, we ought soon to see twenty or more 16 c. p. lamps per horse-power obtained on incandescent circuits. We therefore await further developments with interest.

IT is curious to note how, as time passes, electric motor practice, if the expression may be allowed, follows somewhat the steps pursued in steam engine practice. Taking the latter as a prototype, then, one of the first methods of regulation suggested for electric motors was the employment of a centrifugal ball governor such as is used to-day on most slow-speed engines. The recent development of the high-speed engine, however, has brought forward prominently the spring governor attached directly to the main shaft of the engine. Following out the same idea, Mr. Brush applies a similar device to his electric motor, and thus, by simple means, accomplishes an object of prime importance.

THE vast improvement in central station construction must be evident to all who have had opportunities to compare the old work with the new. The stations now built are often models of excellence, and many of the renovated stations present admirable features in the economy of space, the disposition of shafting and the intelligent care exercised throughout to secure the best results from the plant. This week we give an illustrated article on the Thomson-Houston station at Lowell, operated by a progressive and enterprising company whose unvarying record of prosperity exemplifies once more the fact that electric lighting, properly done, is a good industry to carry on.

THIS has certainly been a "rumorous" week. The air has been thick with reports about the intentions of the Western Union Company, which has been represented as leaving undone very little that it possibly could do in the way of restoring rates, consolidating, reducing rates, combining, stringing overhead wires, buying up the subway construction company, borrowing money to meet current expenses and placing $250,000 on loan. Our readers may take their choice. It should be said, however, that the reports regarding the subway construction company's negotiations with the Western Union Company are denied, and it must be noted that Western Union stock has gone up remarkably. Probably all the reports will simmer down into a restoration of cable rates.

IN bringing before the British Association the results of some measurements in testing standard resistance coils, Messrs. Glazebrook & Fitzpatrick show that it is necessary to avoid the use of newly made coils for accurate work and that coils made of the same wire have different temperature co-efficients, so that each ought to be standardized individually. An important addition to these results must be considered, that noted by Prof. T. C. Mendenhall, and brought out by him at the recent Buffalo meeting of the American Association for the Advancement of Science. Prof. Mendenhall has observed the fact that resistance coils acquire, during use, an increased resistance, said to be due to polarization, and in one case he observed that a coil had increased fourfold in resistance. He has also observed that coils actually give a reverse current for a considerable length of time. The origin of this phenomenon is a matter of speculation. As so much hinges upon the accuracy of standards, the peculiarity observed deserves careful study. Not only scientific, but daily commercial electrical work is dependent upon the stability of the character of wire coils.

THE application of the valuable properties of the peroxide of lead in the storage battery has naturally led electricians to attempt to employ it in the primary battery. One of the difficulties met at the outset consisted in the fact that the peroxide is a powder, and hence was not suitable as an element in a battery. In our last issue, we described Prof. FitzGerald's new peroxide element, "lithanode," in which this great objection has been removed by subjecting the peroxide to a treatment which, while leaving its properties unaltered, converts it into a solid, coherent mass. It was pointed out that this peroxide element was the element *par excellence*, not only for storage but also for primary batteries, and this seems to be, without doubt, the case. The only drawback to the employment of "lithanode" on an extended scale appears to be its probable high cost, since it is made from the pure peroxide. It is interesting to note, therefore, that, being also impressed with the difficulties attending its use, Mr. I. L. Roberts has devised a method of overcoming these, and at the same time of reducing the cost of the peroxide element. His method, which he fully describes in another column, consists in peroxidizing the red oxide of lead through the action of permanganic acid formed by the presence of bioxide of manganese and sulphuric acid. The element thus obtained is quite hard, but is nevertheless a good conductor. All the materials employed in its manufacture are cheap, and while the product is not absolutely pure, this is claimed to be no detriment to its efficiency for the purpose intended. Mr. Roberts' theory with regard to the generation of electricity as the intermediary step causing the generation of heat accompanying chemical combination, including the combustion of coal, is unique, and his arguments in support of it are most interesting.

THE trip of the "Volta" from England to France and back, across the Straits of Dover, continues to attract attention and excite discussion—as well it might. While there is nothing in the voyage to surprise those who have watched the steady advance of secondary batteries and motors in efficiency, it is fortunate the trip was made with so much publicity. These *tours de force* are sometimes necessary to convince a public that nowadays is fairly sated with novelties and marvels. The great point about the voyage is that it serves to bring nearer the time when electricity, working with cleanness and quietness, whether from a dynamo or a storage cell, will meet more of the demands for power in practical operations. The effect produced in England may be judged from the following remarks in the *Spectator*, the representative of cultured Liberal opinion: "If this voyage is the beginning of a wide application of electricity to the propulsion of boats, what a vista of change is opened up! How much increased will be the safety of the passengers when the great American liners can have their boats slung ready for emergency, not only stored with the necessaries of life, but with the means of propelling the boats safely to land! A boat from a shipwreck, which can go ten miles an hour, if only for a couple of days, will have six times the chance of getting to shore or of being picked up that a rowing or sailing boat can have, or even of a steam launch with plenty of coal—for electricity cannot be put out by a wave, as can the fires of an engine. * * * But for mere private pleasure, for the lakes and rivers of England, the electric boat will perhaps give the greatest boon of all. * * * Who shall say that if steam is once driven from the smaller craft, it will not also be abandoned in the larger?" And so on, in a way that shows enthusiasm on the subject of secondary batteries and motors to exist outside the electrical ranks as well as in them. We do not ourselves anticipate seeing these changes in their entirety, or all at once, but we should be loath to predict where the limit of practical application will come, even during the present century.

THE good results which have been brought about by the formation of the National Electric Light Association and the interchange of opinion and experiences obtained at the meetings have naturally attracted the attention of those interested in electrical work abroad, and the indications are that a similar association will be formed in England. A circular has been issued by several of the leading electrical companies and firms, proposing an "Industrial Electrical Association for the Advancement of Electrical Engineering." The objects of the movement will be gathered from the following extract: "The duties of the association will be as follows: (1) To facilitate united action with regard to proceedings affecting the trade in Parliament and other public bodies. (2) To hold periodical meetings to discuss prices. (3) To collect and distribute information relating to the trade, its requirements, difficulties and dangers. (4) To examine and report upon inventions and processes affecting the trade, and the supply and quality of the materials used. (5) To deal with labor questions. (6) If desired, and when requested by the parties, to arbitrate on and adjust trade disputes by competent and recognized authority. (7) To grant certificates of competence in the art to individuals." It will be seen from this that the objects of the proposed association are modeled closely after the work which has been pursued by our own Association. Every one of the seven objects enumerated above has been the subject either of action, discussion or of suggestion at the meetings of the American body—several of them, especially, at the last meeting held in Detroit. If "imitation is the sincerest flattery," the National Electric Light Association has good reason to consider itself an institution of influence and importance. Our English cousins, however, have wisely, it may be thought, gone a step farther than ourselves in this matter, for it will be observed that the organization is not one intended to be devoted exclusively to electric light interests, but, as its title announces, is very broad, in that it includes the "advancement of electrical engineering" generally. By taking this step the coöperation of more individuals interested in the allied branches of electrical engineering is obtained, and signs are not wanting to show that even if it retains its present name, our home Association will in time enlarge its scope and undoubtedly its usefulness.

A Magnetic Experiment.*

BY W. H. PREECE, F. R. S.

My daughter having finished a piece of needle-work, roughly smoothed it down on her lap, and, in doing so, drove a needle into the palm of her right hand, breaking it into several pieces. All these pieces were extracted but one, and this could not be found by probing. It remained in her hand for a fortnight, causing much pain and inconvenience. An examination by Professor Hughes with his induction balance, though giving faint indications of its presence, failed to localize it. I tried several forms of this apparatus, but failed. I strongly magnetized a very fine needle, and suspended it to a light arm by a small paper stirrup and a single cocoon fibre. The damaged hand strongly deflected it, and by moving the hand about the needle invariably pointed to one position, which was marked with a spot of ink. A free and deep incision was made in this spot, and the piece of needle—.4 in. long—was found and extracted. The needle went through the opponens digiti minimi muscle, and was found deeply embedded under the deep palmæ fascia. The operation was performed by Doctors Pocklington and Page, of Wimbledon.

Is The Telegraph War to End?

Rarely has rumor been more active with the affairs of telegraph and cable companies than it is at the present time. Wall street has for a week or more been filled with reports of negotiations between the Western Union and the Baltimore & Ohio Telegraph companies and between the Commercial Cable Company and the pooled cable lines for the cessation of the wars. These rumors have been frequently denied, but the presence here recently of John W. Mackay, the chief owner of the Commercial Company, and of Robert Garrett, the head and front of the Baltimore & Ohio system, has led many to believe the reports that negotiations are in progress. The strength of Western Union in the stock market has apparently been the result of the rumors. One day the report was started that James Gordon Bennett had sold his interest in the Commercial Cable to Jay Gould. This was denied by directors of the Commercial Cable Company, who added that Bennett's interest is a minority one, and that Gould is not in the habit of buying minority interests. Mackay, it is stated, intends to hold on to the Commercial, and it was suggested that Bennett may have sold out to him. Friends of the Commercial Company intimate that the stories on the street emanate from Baltimore & Ohio officials, who are represented as anxious to sell.

Jay Gould is reported to have said that he is opposed to any increase in cable or telegraph rates and that he does not believe the rates will ever be raised, as the Western Union and the pooled cable companies have learned to make a profit on the large increase of business which the low rates have brought. He says that the Western Union now averages 6,000 cable messages a day, while 100,000 land despatches are sent from the main office in this city every day. This statement does not tally with that which friends of the competing company make. They say that the Western Union and the pooled lines are losing heavily by the low rates. Another report in Wall street was to the effect that large holders of Western Union stock are endeavoring to obtain enough proxies to control the next election and to oust Mr. Gould from the control. It was stated that Erastus Wiman, a director of the Western Union, but now intimately associated with Robert Garrett and the Baltimore & Ohio in the Staten Island enterprise, is seeking proxies in opposition to Gould. All former attempts to oust Gould from the control have been failures. Gould and his friends have held a majority of the stock, and Gould himself has been the largest stockholder. The present opposition movement seems to be based on the supposition that Gould has sold most of his holdings at high prices, and now is trying to depress the value in order to buy back.

Among the stories that Wall street discussed this week to explain the sudden rise in the stock of the Western Union Telegraph Company was a report that had to do with John Pender, the English member of Parliament who, not so long a time ago, figured in the Western Union directory and left Mr. Gould and Mr. Field in what has been described as a somewhat indignant mood. It was averred that Mr. Pender met President Garrett during the recent trip of the latter gentleman abroad, and bought outright the control of the Baltimore & Ohio Telegraph Company and was now preparing to merge it with the Western Union system, bring about an advance in American telegraph rates, and so make a handsome deal all around. The story had plenty of entertainment in it, and there seemed to be an added reason for pinning faith to it when the tape announced that the stock of the Baltimore & Ohio Railroad Company, in dealings at Baltimore, had suddenly risen 17 points, going up on Monday to 167, against 150 on Saturday.

People close to President Garrett denied the report and ridiculed it. President Green, of the Western Union, said: "There is not a shadow of truth in it," and he added, "there have been no suggestions, intimations, or negotiations looking to an advance in rates on cable or land lines or to any consolidation of interests." But when a stock with so enormous a capitalization as the Western Union, with its $80,000,000 of shares, shows in one day a gain in market value equal to 4 or 5 per cent. of that big amount, there are few men in Wall street who will believe that there is not something afoot. Such a game might be played readily on small capital stocks, like New England or Lackawanna, but with a property of the heavy Western Union sort it is looked upon as quite a different thing. People who disbelieved the Pender story declared that any advance in Baltimore & Ohio Railroad stock was without consequence. The stock is so held and is so little dealt in that the matter of a market quotation has practically little bearing upon its estimation by holders who are investors, not speculators.

* Paper read before the British Association at Birmingham.

Telephone Circuit for Speaking Condensers.

We have already had occasion to refer to various systems of telephonic communication in which the speaking condenser is employed as a receiver, but recently Mr. Wm. Marshall, of this city, has devised a novel arrangement of considerable interest. While the condenser can

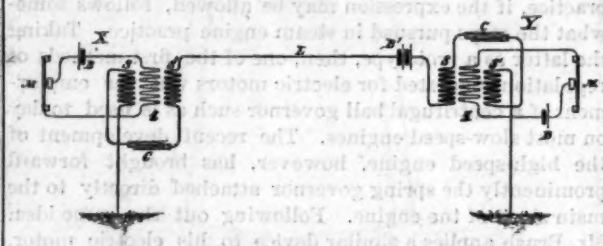


FIG. 1.—CIRCUIT FOR SPEAKING CONDENSER.

be made to speak, Mr. Marshall asserts that unless the line wire connecting the stations is made continuous, as by shunting the speaking condenser, or by the new method described below, the articulation and volume are not perfect, speech being scarcely audible when more than one speaking condenser is inserted in the line.

In order to avoid this defect, Mr. Marshall places at each station an induction coil having two secondary wires and a primary, the opposite ends of each secondary wire being

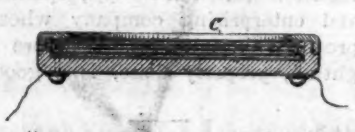


FIG. 2.—SPEAKING CONDENSER.

connected to the opposite poles of the speaking condensers. The accompanying diagram, Fig 1, shows the complete arrangement.

As will be seen, the poles of the speaking condensers *C C* are connected with the opposite ends of the secondary wires *S S'* of the induction coil *I*, the primary of which includes the battery *B* and microphone transmitter *M*. The line wire has in circuit the battery *B'*, which polarizes the speaking condensers *C C*. When the microphone *M* at station *Y* is spoken to, the current induced

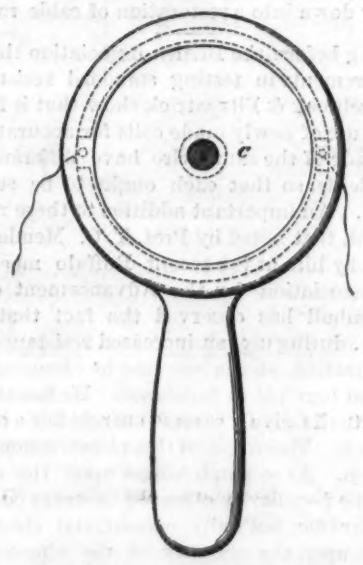


FIG. 3.—SPEAKING CONDENSER.

into the line reaches the induction-wire *S'* at station *X*, changing the polarization of the plates of the condenser *C*, with which it is in contact, directly, and the opposite plates of the same condenser inductively, with the same direction of current through the other secondary wire *S*. With this arrangement of circuits, the opposite plates of the condenser vibrate in unison and hence with greater force.

It has also been observed by Mr. Marshall that the condensers speak much louder when the metallic plates are, in part, not in contact with the insulator. He, therefore, constructs his condenser receiver as shown in Figs. 2 and 3, in which the middle of the plates is made loose by pressing the circumferences together, the plates and insulators bulging sufficiently in the centre to separate themselves, and thus to allow free vibration.

A New Method of Making Incandescent Filaments.

The Wollaston process of obtaining fine platinum wire consists, as is well known, in inclosing the wire, before the drawing process, within a thicker wire or tube, and, after the drawing process, dissolving the silver off by nitric acid. With this experiment in mind, Mr. Robert Dick, of Glasgow, Scotland, has invented a somewhat analogous process in order to obtain fine and dense carbon filaments for incandescent lamps. Mr. Dick has tried a variety of materials, such as silk, cotton, paper, etc., but finds the fibres of the kitool plant specially adapted to his purpose.

In using these fibres he draws them through fine steel draw plates or dies with sharp cutting edges to a uniform size. The fibres so prepared are then inclosed in a fine copper tube, the fibre being much longer than the copper at this stage, to allow of the tube being drawn over the fibre. These tubes are then drawn down, which reduces their diameter and compresses the material within them to the desired density.

The compressed tubes, with the filaments thus formed in them, are then cut into suitable lengths and bent or shaped approximately to the desired form the carbons are intended to retain in the lamps, which admits of their being rolled into spirals or other shapes, in which state they are carbonized within the tubes under pressure by heating them to bright redness in a plumbago crucible in the ordinary way. After this carbonization of the filaments, the copper tubes or other metallic coating is removed from the greater part of their length, or wholly removed by immersion in nitric acid, or by electrolysis. Part of the metallic coating may, however, be left at the ends to serve as convenient means of connecting the filaments to the conducting wires of the lamp.

The employment of the metallic tube serves the purposes of compressing the material forming the filament placed within it, and of maintaining the pressure and shape during the carbonizing process. The advantages, according to Mr. Dick, obtained by this compression of the carbon-forming material during its formation and carbonization are many: First, it strengthens the filament mechanically; second, it enables the carbon to give a high specific amount of luminosity per unit of energy expended on it in the lamp, thus rendering the carbon filament a very durable and economical medium in incandescent lamps for electric lighting.

The Work on the Subways.

In spite of various troubles tending more or less to delay it, the work of providing New York with electrical subways goes on steadily. At the present hour, Sixth avenue offers splendid opportunities for the construction of barricades of the Parisian type, as it is lined for half a mile together with huge piles of uprooted paving blocks. A lively argument was anticipated on Sept. 30 before Judge Freedman, of the Superior Court, on the motion made on behalf of the New York Electric Lines Company for an injunction restraining the Electrical Subway Commission, John D. Crimmins, the Consolidated Telegraph and Electrical Subway Company and American Insulated Conduit Company from interfering with the rights claimed by the Electric Lines Company in the streets of New York for laying electrical wires underground. But Mr. D. S. Gibbens, who appeared on behalf of the Subway Commissioners and other defendants, objected that an injunction can only be granted against a board of State officers and its employés on application to the General Term of the Supreme Court or on notice to the board. An adjournment was taken for one week, when there will be a full argument on the merits.

One of the most important actions taken lately is that on the part of the Subway Commission, in adopting Neuchatel asphalt for part of the work. It is also said to be probable that the Averell system will be tried on at least one section of the work.

No better understanding has yet been established between the Subway Commission and the Western Union Company. It has been alleged, however, that the company has been negotiating for some time to obtain control of the Construction Company, the only hitch being on the question of price. This story is denied, however, by some who should know.

The attempt to show that the permission from Commissioner Squire to begin underground work is invalid, because it was granted after Mr. Squire had vacated his office, has failed, in so far as the Corporation Counsel has practically decided that the work can go on safe from interruption. Rumors of another injunction suit against the Subway Commission have been heard, however, one report being that steps would be taken to bring against the commission what is known as a taxpayer's suit for the purpose of determining the legality of the existence of the commission, and whether they are proceeding legally on Sixth avenue. It was stated that any person or corporation assessed $1,000 or more can, under the laws of 1881, bring such an action before paying the tax. As many of the companies using wires are to be taxed more than this to pay the expenses of the commission, it is claimed that they can take advantage of this law, and that one of them is about to do so. Altogether, subway matters are of an interesting and complex nature just now. One point settled

is that no interference is to be attempted with lines owned by the city departments.

At the District Attorney's office on Monday last, it was said that evidence was being secured of violation of the law by the Western Union Company. A special dispatch of Oct. 4, from Albany, says: "Attorney General O'Brien heard arguments this afternoon on the application of the Electric Subways Commission of New York for the State to begin an action to annul the charter of the New York Electrical Lines Company on the ground of non-user. Mr. Gibbens appeared for the application, and Sidney F. Shelbourne, President of the Electric Lines Company, against it. Papers were submitted, and the matter was put over until Friday, the 8th inst."

The Central Station of the Middlesex Electric Light Company, Lowell, Mass.

In February, 1883, the Middlesex Electric Light Company was organized at Lowell, Mass., and with rented steam-power it installed a ten light Thomson-Houston dynamo, from which, on March 17, six lights were run to illuminate the St. Charles Hotel. At that time a company was already in existence at Lowell operating the Weston system, but two months later a consolidation of the rival companies was effected, and the entire plant of both was removed to the station which had been erected by the Weston Company at a cost of $23,000. Since that time the company has steadily grown and during the year ending May 31 last it had earned a dividend of 8 6/10 per cent. on the capital stock.

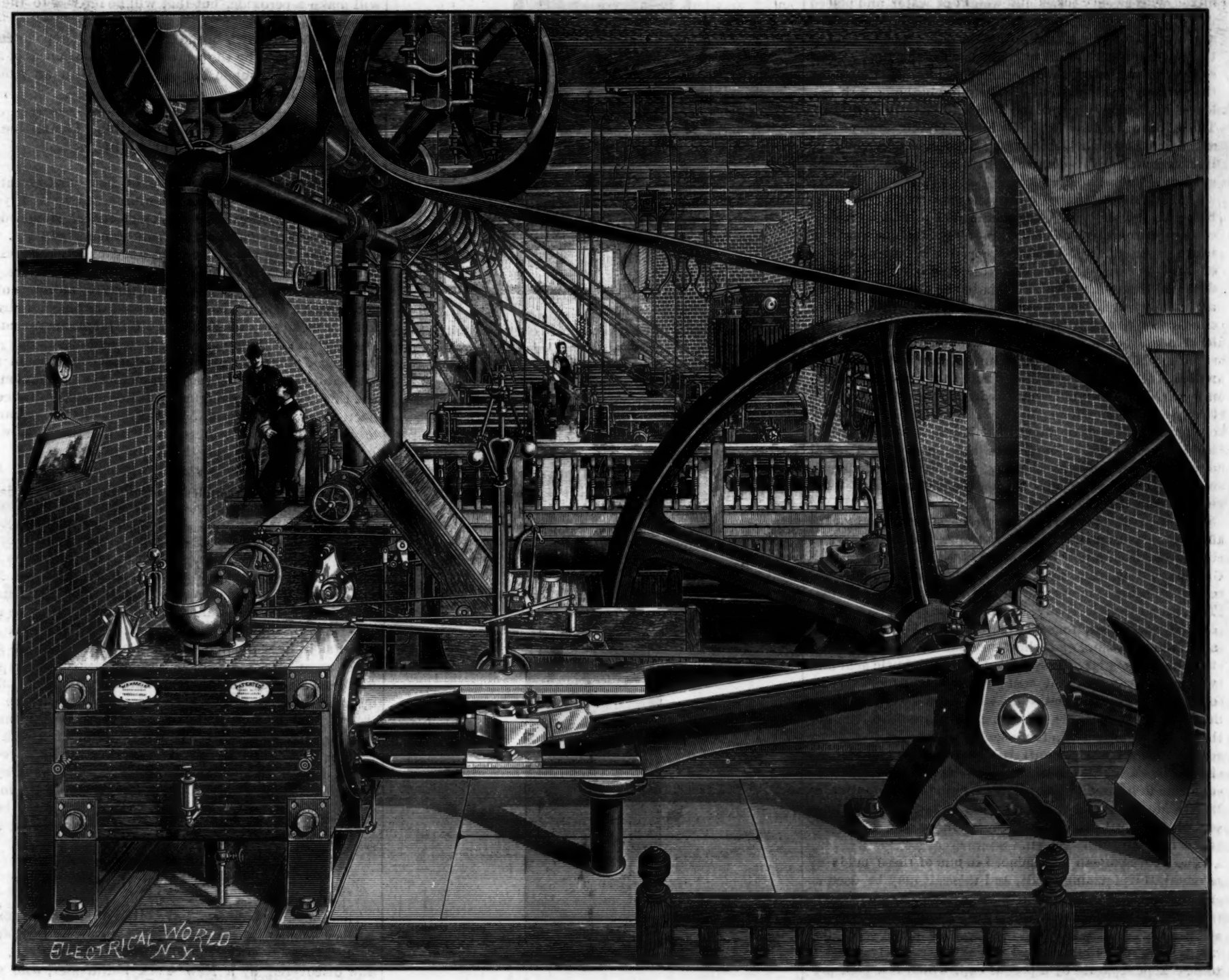
The central station, which is situated on Middle street, now has a capacity of 350 arc lights and 300 incandescents.

The dynamo room and the engine room adjoining are admirably arranged, as shown in the accompanying engraving. There are here ten 25-light, one 30-light and one 45-light arc dynamos, which, together with the 300-light incandescent machine, are ranged in three rows and are belted directly to the main line of shafting. On the walls at the side are placed the switch-board, current-indicators, etc., so that the machines can be readily coupled up in any manner desired. The machines are mounted upon a platform which, by a few steps at each side, connects with the engine-room. The steam power is furnished by a double engine of the Harris-Corliss type, built by Wm. A. Harris, of Providence, R. I., and rated at 250 h. p. Steam is supplied by three steel boilers, two of which were built by Scannel & Wholly and the other by Richard Dobbins, of Lowell.

At the present time 74 arc lights are rented by the city for street illumination, the price per lamp being 60 cents for all-night service. The remaining 200 arc lights, as well as the incandescents, which are all of the Thomson-Houston system, are employed in lighting stores, hotels, offices, etc.

A great deal of the success obtained by the company is due to intelligent management. The steady increase in the demand for its lights requires constant additions to its plant, the 45-light machine mentioned above having been installed but a few weeks ago.

The present officers of the company are: George W. Fifield, President; Ch. R. Kimball, Vice-President; John H. McAlvin, Secretary and Treasurer; Joseph Y. Bradbury, General Manager.



STATION OF THE MIDDLESEX ELECTRIC LIGHT COMPANY, LOWELL, MASS.—THOMSON-HOUSTON SYSTEM.

Telegraph Lines in Canada.

A special dispatch from Montreal of Oct. 1 has the following:

The Canadian Pacific Railway to-day took possession of the telegraph lines throughout British Columbia. This newly acquired system includes all the lines west of Winnipeg. Heretofore, messages for Vancouver's Island, Victoria, and other points on the Pacific coast in Canada have been sent to Chicago, thence to San Francisco, to Portland, Oregon, and then to the point of destination, thereby involving an immense delay and rendering it utterly impossible to obtain a reply on the same day. This is now a thing of the past. Messages sent from Montreal to any point west of Winnipeg and to the Pacific Ocean may be replied to within a few hours. This acquisition to the already extensive system of the company gives it the monopoly of the entire business west of Winnipeg. The sensation of the street to-day is the notice that has been given to the directors of the Montreal Telegraph Company by the Great Northwestern Telegraph Company practically abandoning its guarantee of an 8 per cent. dividend to that company. The Great Northwestern claims that the Canadian Pacific is operating lines of telegraph along certain railways over which the Montreal Telegraph Company claimed, in the transfer of their contracts, to have special and exclusive privileges. The Great Northwestern calls upon the Montreal to enforce these contracts. A gentleman well posted in such matters said: "The Great Northwestern, in essence, says that if this is not done forthwith it will refuse to further guarantee the Montreal Company's stock. As the Western Union Company owns a large portion of the Dominion Telegraph Company's stock, it is supposed that they will divert their business to that company, thus leaving the Montreal out in the cold." "The whole matter hinges upon the interpretation of the agreement between the companies," said a leading lawyer who took an active part as one of the counsel when the contract was made. "Section 7 of the contract stipulates that the contractors, the Great Northwestern, bind themselves during the continuance of the contracts to perform and execute all contracts of the said company in the several contracts and agreements between it and all railways then in force and effect. That is very clear, so it only remains to be seen or proved whether or not the companies now controlled by the Canadian Pacific have violated their contracts with the Montreal Telegraph Company." A meeting of directors of the Montreal Telegraph Company will be called at an early day to consider the situation.

"The Electric Motor."—In reply to numerous inquiries regarding this work, to be issued from THE ELECTRICAL WORLD office, it may be stated that the book is now going through the press and will soon be ready. Owing to the late activity in the motor field, it has been thought well to include all the recent developments and improvements; and with this object a great many new illustrations have been made. The delay is slight, and the work will gain greatly in comprehensiveness and usefulness. The price will be $3. The book will be a quarto, 12 × 9. It will contain about 200 cuts and be not far short of 250 pages.

The Roberts Peroxide Battery.

BY I. L. ROBERTS.

In a previous article in THE ELECTRICAL WORLD* I have stated that no galvanic action can take place unless water be present. This is true so far as our knowledge of electrical measurements or electrical phenomena reaches.

It is probable, however, that when coal is consumed in oxygen or a metal is burned in chlorine or fluorine, the action is electric; or, in other words, all chemical action first produces a current of electricity. But as we do not know how to attach binding posts to such elements, the current is not made manifest to our senses. As the currents thus made are entirely short-circuited on themselves, they produce only the phenomena of heat, as does the current in an ordinary battery when short-circuited on itself. As soon as we are able to get some way of conducting away the current from simple chemical union, then we will reach the ideal method of producing electricity.

At present, we know of no other way of producing galvanic currents than by the use of *acid radicals* through the agency of water. Thus, if sulphuric acid, H_2SO_4, be mixed with twenty times its weight of water and placed in a glass jar containing a strip of well-amalgamated zinc and a strip of platinum, no action takes place. But if the platinum be brought in contact with the zinc, a great shower of gas bubbles will begin to rise immediately from the surface of the platinum. These bubbles of gas, if collected and examined, will be found to be pure hydrogen. The sulphuric acid radical SO_4 has taken one atom of zinc and formed the salt $ZnSO_4$, zinc sulphate, and given up its hydrogen. It is this element of hydrogen that forms the subject of the present article.

If a galvanometer is placed in the circuit of the simple battery above described, the needle will at first indicate a certain current which will gradually fall nearer and nearer to zero, not because there is an insufficiency of acid or zinc, but because this hydrogen gas, when divorced from its radical, SO_4, is in the nascent state for an instant, and has the power of partially uniting or clinging on to any conductor yet discovered. It has the least affinity for platinum or carbon of all known substances. If allowed to remain untouched, the electrodes will in a few minutes lose fully half their power, becoming coated or saturated with hydrogen, and are then in the condition known as polarized. Just here is the rock on which the hopes of many inventors in electrodynamics have come to grief. There have been many mechanical devices tried, such as shaking, rotating the elements, blowing currents of air against the plates, and the like, but none of them have been successful to a satisfactory degree, so as to warrant their general introduction, for the simple reason that there is a deeper fact which must be viewed from a new stand-point.

This fact is, that hydrogen in sulphuric acid has a certain affinity for its radical, SO_4, as well as for zinc. The proportion is easily found by taking a platinum or carbon conductor, together with a large piece of well-amalgamated zinc, and short-circulating them for, say, four hours in a large vessel filled with sulphuric acid and water, so that the acid will not be exhausted. At the end of that time the platinum will have absorbed all the hydrogen it is capable of, and if the circuit is quickly broken and measured, the absolute electromotive force of zinc over hydrogen will be noted. It will be surprisingly small, about ½ volt. The same may be tried with chlorine in hydrochloric acid, HCl, or iodine or fluorine, or any acid, even vinegar (acetic acid). They all give different electromotive forces in proportion to the affinity of their radicals for hydrogen.

The hydrogen can be displaced in one of these acids by a metal, thus forming a salt, and this salt may be used as the electrolyte.

This, however, may be said to be going from bad to worse, as the metal of the radical adheres to the zinc still more tenaciously, and completely coats it unless kept separate by a porous cup, which is a poor preventive. But this is not the case with metallic bases more electropositive than zinc, such as all the alkalies, but the difficulty with the hydrogen is not at all removed if an alkaline salt is used, such, for instance, as sal-ammoniac, NH_4Cl, or table salt, NaCl. Here the chlorine will leave the sodium to unite with the zinc. But this action would not take place if the sodium could not also get something to unite with. Hence, it splits an atom of water, and makes NaHO + H, sodium hydroxide and free hydrogen. In the case of sal-ammoniac, $Zn + NH_4Cl = ZnCl + NH_3 + H$. Here, as before, is the omnipresent hydrogen. In the earlier days chemists attempted to absorb this gas instead of getting rid of it, and as might have been expected, it was not only absorbed, but the electromotive force of the battery was more than trebled. Now the reason of this is that, weight for weight, hydrogen when oxidized yields more than four times as much energy as carbon and more than twenty-five times as much as zinc.

Poggendorff, Bunsen and Grove were the first chemists to make such attempts with the success that all know. Poggendorff used bichromate of potassium, and Bunsen and Grove, strong nitric acid.

These substances were used because they contained large amounts of oxygen, which would unite with hydrogen. They were used in contact with the carbon or platinum, and absorbed the hydrogen as fast as the zinc took up the acid radical, yielding in electric energy the equivalent of its heat energy.

These batteries were the greatest electric generators in their day. But their cost and the great difficulty of keeping them in order, to say nothing of the crystallization with the Poggendorff method, and the fumes of the others, has rendered them nothing short of a nuisance. The recent discovery of methods of taking away the alkali from bichromate of soda and its great cheapness has given new life to the Poggendorff battery. Thus pure chromic acid can be purchased at the low price of 18 cents per pound in quantity. This is in the solid form, so that if the other difficulty of local action could be overcome, comparatively cheap electricity could be generated with it, using sulphuric acid and zinc.

The ideal battery is one which will not deteriorate on

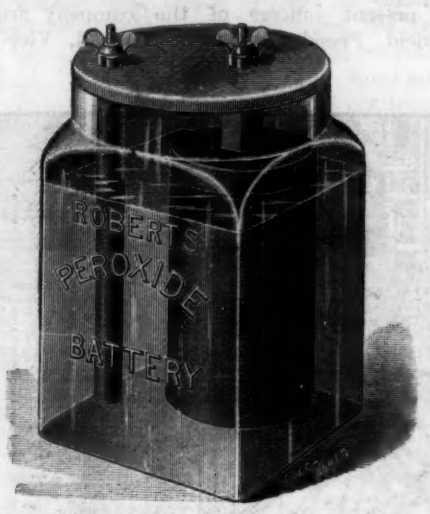


FIG. 1.—THE ROBERTS PEROXIDE BATTERY.

open circuit and will be constant on closed circuit. Both these qualities have been attained, but not in the same cell. Chromic acid as a depolarizer is constant enough; while sal-ammoniac, as a single fluid, will not destroy on open circuit to an injurious extent. I think I may venture to say that the nearest approach to the ideal battery that has come before the public is one recently invented by myself and known as my "Roberts' Peroxide Battery." This battery is represented in perspective in Fig. 1, and the peroxide element employed is shown in Fig. 2.

The main feature in this battery is the peroxide of lead which is used as a depolarizer. It has been known in electrochemistry for some time that peroxide of lead is one of the

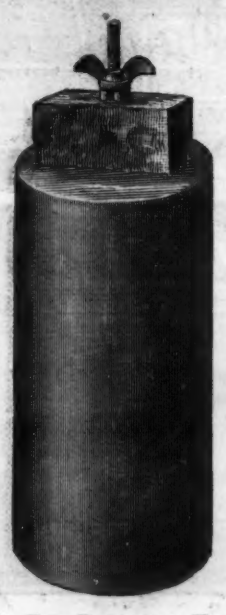


FIG. 2.—THE PEROXIDE ELEMENT.

most powerful depolarizers, as used for instance in the secondary battery. But no commercial use has been made of it in primary batteries, because, first, it was a powder and difficult to apply to the purpose; and, secondly, it was too costly to put into competition with peroxide of manganese, which, though not so good, was cheap. It was the writer's fortune to discover how to make it cheap enough and solid enough to far outstrip manganese dioxide as a depolarizer.

This peroxide need not be of lead, but may be of silver, mercury or any easily oxidizable metal. It is made by adding to red lead, for instance, permanganate of potash in a powdered form and well mixing them. To this there is added any acid which will decompose the permanganate such as sulphuric, or preferably hydrochloric acid. This will unite with the alkali and liberate the permanganic acid, which is the most powerful oxidizer known to chemists. This will immediately unite with the red oxide of lead, Pb_3O_4, and produce PbO_2. The whole mass, if properly made, is in a semi-liquid form, and if poured into a mold containing a carbon, Fig. 2, it will set in a few seconds. The mold can be opened, and the whole removed and dried, when it will be porous like a carbon and will be a conductor of electricity. It will be hard as carbon and will adhere firmly to the carbon core. This element can be used as a carbon in an acid battery with nothing but plain sulphuric acid and will furnish a constant current. For, as soon as the sulphuric acid radical acts on zinc and gives up its hydrogen, the following action takes place: $Zn + H_2SO_4 = ZnSO_4 + H_2$. The liberated hydrogen unites immediately with an atom of oxygen in the peroxide of lead and forms water, thus: $H_2 + PbO_2 = PbO + H_2O$. Thus no polarization can take place as long as any peroxide of lead remains.

But it is with a solution of common table salt and a very little bichromate of soda that the nearest approach to the ideal battery is attained. There is then no local action, it being nearly constant, and the battery has an electromotive force of almost two volts. One of the ordinary size will give about three to four ampères. The bichromate of soda is added for the purpose of preventing the small amount of chloride of lead from dissolving and forming lead trees on the zinc.

If, however, a small quantity of it is added to the red lead mixture, it will produce the same result as the peroxide is formed. Chromic acid, if added to the red lead, will make a peroxide, but that will be inferior to the permanganic acid.

The element shown in the engraving will depolarize the hydrogen formed by the combustion of two ounces of zinc. This will yield about 46 ampère hours, with an average E. M. F. of 1.8 volts.

* See ELECTRICAL WORLD, Aug. 14.

Report of the British Association Committee on Standards of Light.

The committee on standards of light met repeatedly during last winter. It had been proposed in last year's report to carry on experiments on electrical standards in the hope of arriving at an absolute standard of light. One of the first steps was to discover a means of reproducing a definite temperature, and certain experiments were proposed for this purpose. At one of the first meetings of the committee Captain Abney announced that he had already found a means of doing this in a different manner from that proposed in the committee's report, and depending only upon the change of resistance of the carbon filament with temperature. Under these circumstances the committee left this part of the experimental investigation to be reported upon by Captain Abney. His further researches have, however, led him to believe that the law which he had announced to the committee does not hold with all qualities of carbon filament. He has, however, been engaged upon further experimental researches which are almost ready for publication, and which have an important bearing upon the labors of the committee. In last year's report attention was drawn to the value of the pentane standard of Mr. Vernon Harcourt as a practical reproducible standard, and Mr. Rawson has been since then engaged in a further examination of this standard. Sir James Douglass has also made some experiments which are not quite completed, but have gone so far as to give great promise. Some account of these experiments in this report had been expected by the committee, but the absence of Sir James Douglass on official business has interfered with this. At one of the first meetings of the committee the secretary showed what he had done in the way of improving thermopiles, such as it was hoped would be of use in the investigations recommended in last year's report, and he was instructed by the committee to proceed with the construction of the instrument, which has been completed and was placed before the section. The committee respectfully requested to be reappointed, with a grant of $125.

Gas-Light the Cause of Baldness.

The causes of baldness have often been sought for and guessed at, but it cannot be said that any satisfactory explanation has, up to the present time, been given. It is now discovered by a New York hairdresser, who says: "People give all kinds of explanations for it—dissipation, cutting the hair too short, letting it grow too long, smoking, drinking strong coffee, worry, wearing high hats, wearing low hats, wearing your hat indoors, not wearing it outdoors, late hours and a hundred other things. Now you will notice that there are no classes of men more frequently bald than retail salesmen, book-keepers and office clerks in certain lines of business. Why should baldness affect them more than others? Because they habitually stand or sit nearly every evening under gas-lights. Book-keepers always have a strong light right over their heads or just in front of them. So do clerks who have to work at night. Retail salesmen sell goods at night directly under two powerful burners, and most of the time their heads are not more than two or three feet from the flame. The artificial heat dries out the hair, makes it brittle and unhealthy and finally kills it at the root. If you will pass your hand through your hair after you have been standing under a gas light for a few moments you will see at once how it is. Although you may not have noticed the heat on your head, your hair, if you've got any, will be hot to the roots. You'll be surprised to observe, too, at what a distance from the light the hair will absorb the heat. Now there is nothing so bad for the hair as getting it dry. That is why the use of water on it is so injurious—because it evaporates so readily and takes with

it the natural oil of the hair. Your hair should be moist all the time and with the oil that is secreted by the little cells at the roots. When the oil is continually and rapidly dried out, as it is when the head is kept heated by gas-light, the cell dries up and the hair falls out. People who sit under the gas-light should wear some kind of a cool, non-conducting headgear to protect themselves. I have an idea, too, that after the electric light has been in universal use for a generation or two, baldness will be as scarce as it was before gas-lights and nightwork got common together."

The New Brush Motor.

Recognizing the growing importance of the electric motor in the field of applied electricity, Mr. Brush has for some time past devoted his attention to the construction of a motor which should fulfill the conditions required in a successful prime mover. Steadiness of power and constancy of speed under all loads are two of the principal objects to be sought for, and in the new motor these have been provided in a very ingenious way.

The machine, which is illustrated in the accompanying engraving, Fig. 1, closely resembles the Brush dynamo, which is too well known to require extended notice; but the devices added to the machine for the purpose of securing the advantages above mentioned are decidedly interesting, and merit a detailed description.

It will be seen that, mounted on the shaft between the commutator and the journal bearing, there is a cylindrical shell. The shell contains the governor by which the speed of the motor is maintained constant. The mode of regulation adopted by Mr. Brush consists in causing the governor to adjust the commutator automatically with relation to the brushes. To this end the commutator segments are mounted upon a sleeve on the shaft, so that they can be revolved to any desired extent under the influence of the governor.

Our illustrations Figs. 2 and 3 show the governor in detail. As will be seen, the commutator brushes *C C*, remain fixed, and loosely mounted on the shaft *E* is the commutator sleeve *a*, which turns freely. The commutator sections *d*, are insulated from the sleeve *a*, and are connected to the armature bobbins by flexible wires, so as not to interfere with the rotary adjustment of the commutator. To the inner periphery of the cylindrical shell *G*, which is bolted to the shaft, the governor arms *H H* are pivoted. The inner free ends of the arms are connected to the opposite arms by means of spiral springs *I I*. In addition, the arms carry each an adjustable weight *K*. The links *L L*, attached to the arms *H H*, are connected to a disc upon the commutator sleeve. Hence, it will be readily understood that as the governor shell rotates with the pivoted weights *K K*, the latter, by centrifugal force, will be removed toward the periphery of the shell, and, through the medium of the connecting links *L L*, will impart a rotary movement to the commutator, varying its position on the armature shaft.

The action of the governor is precisely analogous to that in a steam engine. When in a state of rest, the springs draw the weights toward each other and maintain the commutator segments at the maximum point of effect with relation to the brushes. When current is switched on to the motor, the governor weights in their revolution are thrown outward and rotate the commutator, carrying the maximum points away from the contact points of the brushes and in the direction of rotation of the armature. This action decreases the effect of the driving current until a point is reached where the effect of the driving current is balanced by the load on the motor, and the speed of the latter remains constant. Now, should the speed of the motor be retarded by a decrease of current-strength with no corresponding diminution of load, or by an increase of load with no increase of current-strength, the governor balls will be retracted and drawn toward each other by the spiral springs, and thereby rotate the commutator in a direction opposite to the motion of the armature shaft, the effect of which is to move the maximum points on the commutator nearer to the brushes, and thereby increase the speed of the motor. On the other hand, should the speed of the motor be increased above the normal rate, owing to an increase of current-strength or to a decrease of load, the governor-balls will be caused to recede from each other and rotate the commutator in the same direction as that of the armature shaft, and cause the maximum points on the commutator sections to be moved away from the brushes, and thereby decrease the speed of the motor. In this manner provision is made for all contingencies affecting the working of an electric motor. The parts constituting the governor are few and simple.

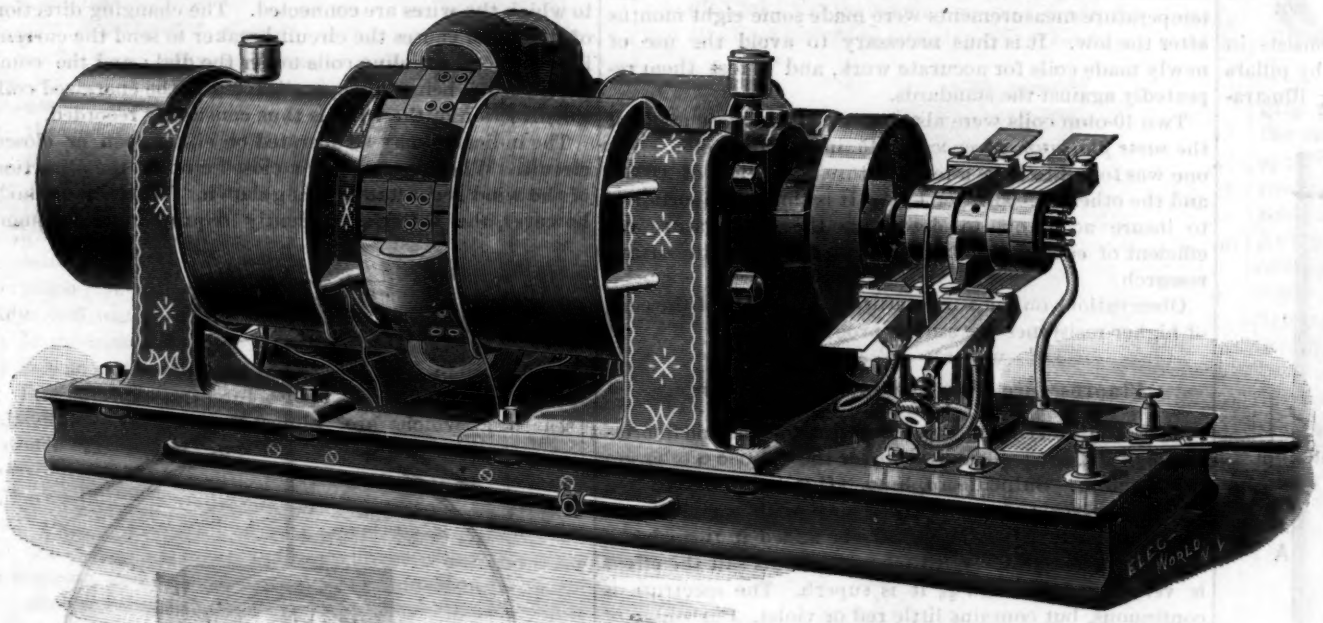


FIG. 1, THE NEW BRUSH MOTOR.

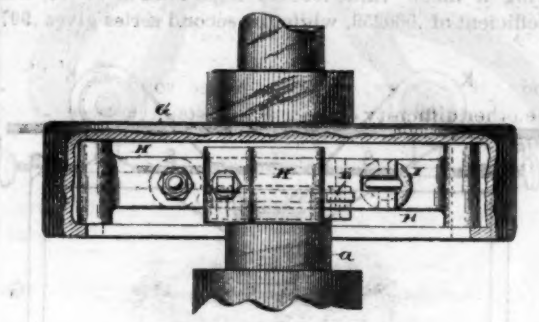


FIG. 3.—NEW BRUSH MOTOR.

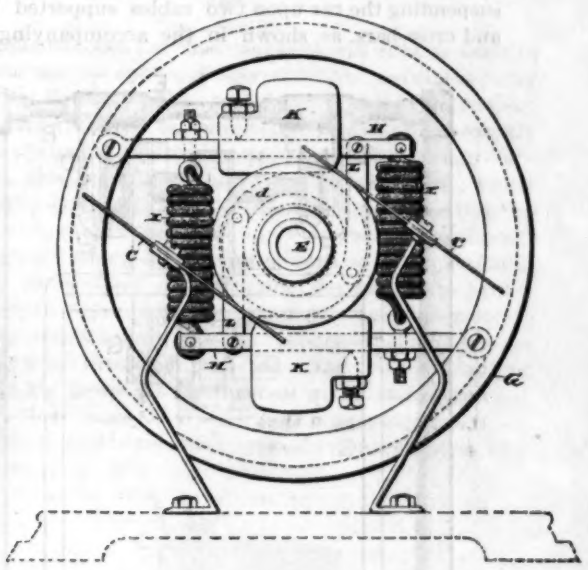


FIG. 2.

The Brush Electric Company, of Cleveland, O., is now engaged in the manufacture of these motors, which range from the smallest up to 40 horse-power.

Electric Lighting in Italy.

An Italian correspondent of *Industries* says: Many of the smaller towns of Italy are about to follow the example set them by Milan in the matter of electric lighting. The success of the Edison Company in Milan has been so great that the municipal authorities are encouraged to become themselves undertakers for the electric light, and are inviting tenders for the supply of apparatus and material. One example is furnished by the town of Udine, which is about to provide itself with 5,000 glow lamps for house and street lighting. The motive power in this case is obtained from three waterfalls, the most distant of these being situated three miles away from the town, and the nearest 1¼ miles. At each of these three stations alternating current dynamos will be driven by turbines, but the exciting current for all these machines will be supplied by a continuous current dynamo placed at the last-named station. The alternating current delivered by these machines will be used to work transformers, placed at convenient points. The peculiar configuration of the town, and the unequal distribution of the lighting, requires the use of a rather large number of transformers. Each of these sub-stations is surrounded by an Edison net work, which distributes the secondary currents to the lamps. The total loss of energy allowed in the main lines between the machines and the transformers is estimated at 20 per cent. This high figure has been chosen in order to save copper in the conductor. The loss in the secondary mains will be limited to 4 per cent. of the potential at the terminals of the secondary coils of the transformers. It is expected that the installation at Rome will be ready for work before the end of September. The peculiarity of this installation is that it has been undertaken by the gas company of Rome. Here also alternating currents and transformers are employed.

The Paris Exhibition of 1889.

The French Government has published a decree containing the regulations for the International Exhibition to be held in Paris in 1889. The following clauses will be of interest to our readers: The Exhibition will be opened on May 5th, 1889, and will close on 31st October following. In the section devoted to each nation, the exhibits will be divided into nine principal groups, which will be subdivided among themselves into classes. The sixth group is devoted to "Apparatus and Processes of the Mechanical and Electrical Industries." Class 62 of this group contains the following subdivisions: Production of electricity; electrostatic apparatus, batteries and accessories, dynamos and magneto-electric machines, accumulators; transmission of electricity; cables, wires, and accessories, lightning conductors, measurement of electricity, and apparatus connected therewith. Applications of electricity; telegraphy, signaling, telephones, microphones, photophones, electric light, electromotors, electric railways, transport and distribution of force, transformers, medical electricity; electro-chemistry; electro and permanent magnets; mariners' compasses; and electric clocks; various apparatus. No rent will be charged for space at this Exhibition, and motive power will be supplied gratuitously, provided that due notice of requirements be given.

Electric Lighting at Cannock Chase Collieries.*

BY A. SOPWITH.

This paper must be considered as merely introductory to a visit made by members of the section to the Cannock Chase Colliery, and deals in a general way with some special advantages and economies in connection with the electric lighting of collieries.

The author points out the convenience and economy in utilizing the ventilating fan engines for working dynamos, on account of the regularity of speed (which apart from the requirements of an installation is kept within a limit of one to three per cent., such variation being a gradual diminution or increase) and the fact that such engines run continuously night and day. The fan itself acts to some extent as a regulator, as the tendency to run away on switching out of lights is modified by the increasing resistance of the air; *vice versâ* the putting on of load and consequent tendency to slacken speed is reduced by the diminished work done by the fan at a few revolutions less; again, the comparatively small proportion of power required for working the dynamo, amounting to from seven to twelve per cent. of the usual working power of engine, may be considered an advantage.

The addition of countershafting in cases of slow-running fans, or single pulleys in case of quick-running fans, is an easy and inexpensive matter.

Allusion was made to the small extra consumption of coal in practice, and the merely nominal value of the slack which is consumed. In further connection with the working expenses, viz., replacement of lamps, it was mentioned that the underground workings in vicinity of shafts (extending to 200 yards or 300 yards) admit of lamps being worked considerably below power with sufficient effectiveness, and actual lives are given (including breakages) showing at one pit an average of 2270 hours. The men who are required to act as examiners of machinery, and have no specifically regular work to do otherwise, replace lamps, and can attend to any occasional work connected with installation. As a matter of fact the three installations now working at Cannock Chase have not necessitated the employment of an extra man.

The only original feature—at least the author presumes it to be so—is the utilization of old iron and steel pit ropes

* Abstract of paper read at Birmingham, before the British Association.

for main and branch cables. From four to five miles of rope are worn out annually, varying from ¾ in. to 1¼ in. in diameter and over, and the conductivity of this has been proved to be about one-seventh that of a copper cable (of high conductivity) of similar dimensions. In the case of shafts, in order to avoid the injurious effects of water, the roes are encased in wood boxes strung down the side of shaft and roughly insulated on brackets. Underground, one of the ropes is simply wrapped with old brattice cloth or tarpaulin. On the surface the ropes are laid in brick channels filled in with gas tar and coal dust, but it appears from the last trials that it is sufficient to lay the ropes side by side in the same material; there is no appreciable loss of current. The fact that old ropes are only worth a few dollars per ton enables a profuse use of cables to be made, and at one of the installations the current is conveyed a distance of nearly 1,300 yards (double distance) with a resistance of only .05 ohm, nearly one-half of which is due to the insertion of a length of high conductive copper cable.

A brief description of the last installation—which includes lighting of all surface works (extending over five acres), the underground workings in vicinity of shaft, and at a distance of 620 to 700 yards, the church, schools and houses—was also given.

The Van Depoele System of Telpherage.

The transportation of goods and passengers by overhead suspended cars driven by electric motors is a most promising field of application, and sufficient experience has already been obtained in practical work to show its feasibility. Mr. Ch. J. Van Depoele, among others, has devoted considerable attention to this line of work, and some years ago had in operation at the works of the Van Depoele Company in Chicago an experimental line 500 feet in length.

The method adopted by Mr. Van Depoele consists in suspending the car upon two cables supported by pillars and cross-bars, as shown in the accompanying illustra-

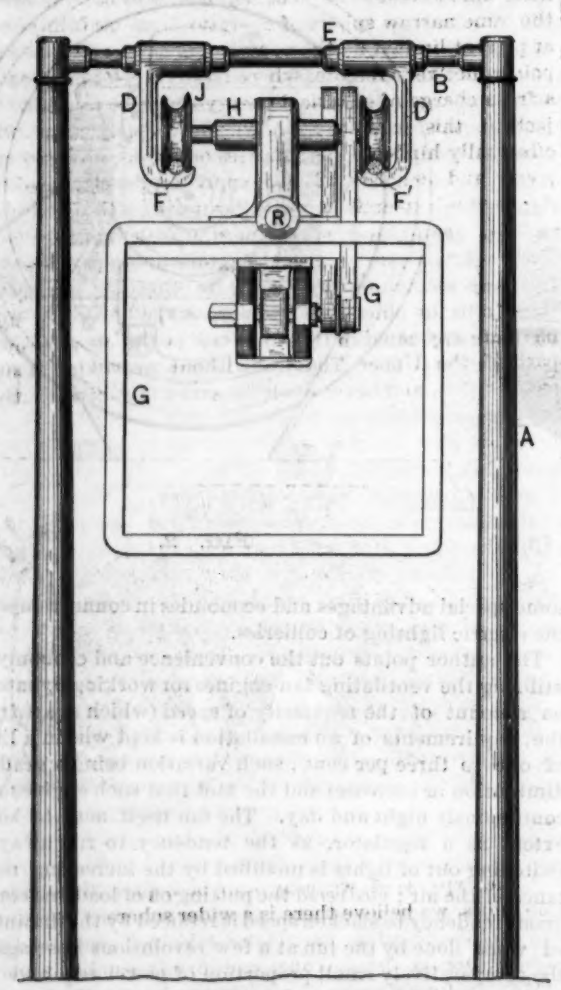


Fig. 1.—Van Depoele Telpher System.

tions, Figs. 1 and 2, which represent respectively a front and a side view of the arrangements. The hangers *D*, which support the cables *F F'*, are insulated, and the cables themselves form the positive and negative terminals of the motor. The band wheels *K K'*, are connected with the driving wheels of the electric motor *C*. Buffers *R R* are also provided at the ends of the rods *S S*, the inner ends of which are provided with buffer springs.

Surveying by Electric Light.

M. Otto Chrismar, a professor at Schemnitz, in Hungary, has, says *Engineering*, applied the incandescent lamp as fed by accumulators to facilitate surveying operations in ill-lighted mines, by means of the theodolite or level. A magnetic compass might, of course, be influenced by the currents. Two lamps are employed, one large to light the angle to be taken, and a miniature one to light the vernier. We need not enter into the details of these lamps or of the accumulators and the connections; but it may be mentioned that two separate accumulators are employed, both portable. One of these goes along with the larger lamp and the other with the smaller lamp and instrument

On Variations in the Values of Some Standard Resistance Coils.*

BY R. T. GLAZEBROOK AND T. C. FITZPATRICK.

The values of the legal ohm standards have been carefully determined for various temperatures. The observations on the coil C. C. L. 100, extending from November, 1884, to January, 1886, are all satisfied by the value .998770 legal ohm at 12° 28, with a temperature co-efficient of .000272 per 1° C., while the values for C. C. L. 101 fall into two series, the one set, November, 1884—July, 1885, giving a mean value .998815 legal ohm at 14° 15, with a co-efficient of .000259, while the second series gives .997860

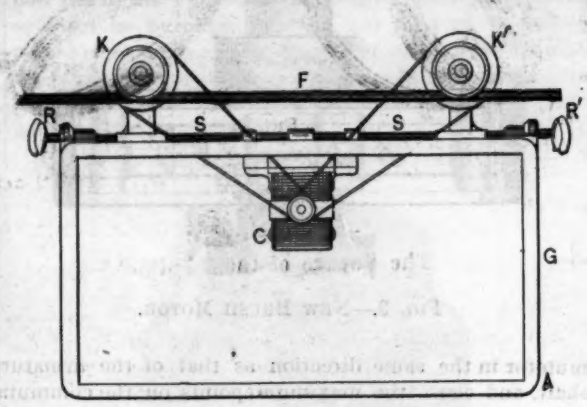


Fig. 1.—Van Depoele Telpher System.

at 10° 98, with a temperature co-efficient of .000272 per 1° C. From this it follows that at 12° during the intervals between the two series of observations the resistance of C. C. L. 101 fell by about .00015. The low temperature co-efficient of series (1) is due to the fact that the high temperature measurements were made some eight months after the low. It is thus necessary to avoid the use of newly made coils for accurate work, and to test them repeatedly against the standards.

Two 10-ohm coils were also tested. They were made of the *same platinum silver wire* ·015 inch in diameter. Yet one was found to have a temperature co-efficient of .00289, and the other of .00312 per 1° C. It is thus of importance, to insure accuracy, to determine the temperature co-efficient of each individual coil used for an important research.

Observations on the temperature co-efficients of the coils of higher resistance are still in progress.

Fluorescence from the Electric Discharge.

M. Lecoq de Boisbaudran is investigating the fluorescence of different substances under the electric discharges in a vacuum. Sulphate of lime, after being heated to a dull red, gives a feeble fluorescence with a continuous spectrum; but when MnO, SO_3 is added it furnishes a beautiful green tint. With $\frac{1}{100}$ part of this salt the effect is very fine and with $\frac{1}{10}$ it is superb. The spectrum is continuous, but contains little red or violet. Carbonate of lime gives fluorescence *in vacuo* after strong calcination and a violet tinge at the electrodes. With carbonate of lime, rendered manganiferous, there is an orange fluorescence after calcination, sulphate of magnesia, after being heated red a little, gives a feeble fluorescence of a greenish white, with continuous spectrum. Pure carbonate of magnesia gives no notable fluorescence after strong calcination. Simflarly, carbonate of magnesia containing a little carbonate of manganese, furnishes fluorescence. Sulphate of zinc, after heating to dull red, gives a feeble fluorescence of a pale rose color. Sulphate of cadmium, oxalate of strontium, and some other salts, also yield a fluorescence in vacuum.

The Telephone Service in Charleston

It will be remembered that at the St. Louis meeting of the National Telephone Exchange Association, a subscription was made, on the initiative of Mr. Carson, in behalf of the sufferers by earthquake at Charleston. General Barney, Secretary of the Association, publishes the following in regard thereto in his latest news-letter:

"'General Superintendent D. I. Carson, of the Southern Bell Telephone and Telegraph Company, furnishes the following information concerning the effect of the earthquake in Charleston upon the telephone exchange business in that city. He says:

"'The damage was not so great as might have been expected. No lines were thrown down by the shock, but wires were broken by falling walls in all parts of the city, and in one or two cases special routes were entirely destroyed. The Exchange opened within a week after the earthquake, much to the gratification of the citizens, one of whom said the ringing of his telephone bell was the most cheerful sound he had heard since the earthquake. We are now working with 377 out of 395 stations. The earthquake did no damage to our business in any other part of the territory.'

"In the last number of the news-letter was reported the fact that a subscription for the relief of Charleston was taken up at the St. Louis meeting of this association. Subsequent additions to the fund have made the total amount $285, and in acknowledging its receipt, Captain F. W. Dawson, of the Relief Committee at Charleston, concludes his letter as follows:

"'Pray accept my most grateful thanks on behalf of our suffering people. Rest assured that it will be put, as you request, where it will do most good, and that this timely and generous contribution from the members of the Telephone Convention shall never be forgotten.'"

* Read before the British Association, section of Mathematical and Physical Science.

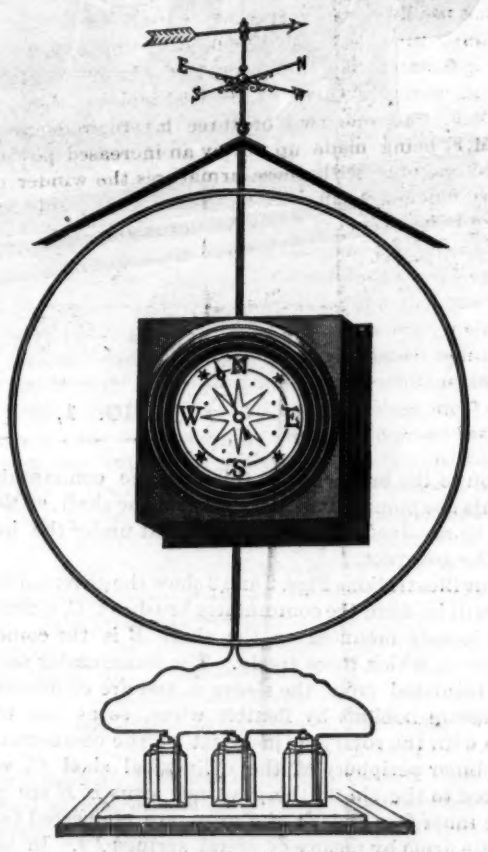
An Electric Wind Indicator.

The increasing interest taken by the public at large in meteorological observations is being greatly fostered by the admirable system of daily weather reports furnished by the Signal Service Bureau, and has had the effect of causing the introduction of numerous methods of demonstrating conveniently the state of the atmosphere. We frequently find thermometers, barometers, etc., in public places and private residences, but weather vanes showing the direction of the wind are still usually relegated to the tops of steeples.

With the object of bringing the latter also within convenient range of observation, Messrs. Seth W. Fuller & Holtzer, of Boston, Mass., have designed an ingenious apparatus by which the direction of the wind can be indicated by an arrow placed in any convenient position within a building.

The accompanying illustration shows the indicator and the manner of its connection with the weather vane. The square indicator box placed against the wall has marked upon its dial the different points of the compass. Beneath the dial is a series of magnet coils, located immediately under each compass point, and the coils are connected by a wire, joined in a cable, with the vane exposed on the roof. At the base of the vane is situated a circuit-breaker to which the wires are connected. The changing direction of the wind causes the circuit-breaker to send the current into the corresponding coils under the dial; and the compass needle being always attracted to the energized coil, the direction of the wind is thus constantly recorded.

The indicator may be operated on either open or closed circuit. When operated by a closed circuit, the direction of the wind is constantly being shown. With this method, however, the batteries evidently require more frequent



An Electric Wind Indicator.

attention. With the open circuit system, a push-button is placed in the circuit, and when it is desired to locate the direction of the wind, the simple pressure of the button allows the current to pass and the indicator arrow immediately points the direction of the wind.

It is evident that several indicators may be placed in different parts of a building and all operated from the same battery.

Blowing up a Shark.—The following sailor's yarn is now in course of circulation: "We were lying off Natal the other day, when a most exciting occurrence happened. We saw two or three monster sharks playing round the ship for some time—the largest of them measuring about 14 feet long—so we baited a line with a small piece of pork and dropped it out to him. He calmly swallowed the bait, hook and all, and cut the line with his teeth, taking no further notice of it. We then had recourse to strategy. The breast of a buck, which had been hanging up some time and was rather high, was weighted, in order to sink it, and a hand-charge of guncotton inserted therein, the whole being connected by wire with a boat's battery. No sooner had the vension reached the water than the shark made straight for it; but just as he opened his mouth to swallow the bait the charge was exploded, his jaws being completely shattered. The monster turned on its back and sank in the bay."

How to Wind an Armature.

It is our intention, says Mr. R. Fuge, in the London *Electrical Review*, to show here the usual method of winding armatures, which, like everything worth learning, requires patient practice to make a respectable job of.

We will suppose that the necessary calculations have been made, and that, therefore, we know how many sections the armature will contain, and how much wire of a known gauge will be wound on each section. Let us take, as an example to describe the method, a Gramme armature. The first thing to be done is to insulate it and to divide it off into the same number of sections as it will contain coils, then, having fixed it down firmly, we may begin.

Three sections are usually wound at a time, and the first three are kept in position while being wound by guides similar to those shown in their place in Fig. 1; two pieces of strong tape are laid along the armature, and, for convenience, are screwed down under the left-hand guide, (not lying over it, as shown for clearness in the figure) but lying over the right-hand one; these pieces of tape should be left sufficiently long for their use, which will be described afterward. It will be noticed that the guides have the inside metal blocks considerably longer than the outside; this is to compensate for the smaller diameter inside, which will not allow of the same number of turns in a layer inside and outside, and therefore we have to get a greater number of layers inside than outside. The winder must use his own judgment to tell him when to begin placing turns of a coil which form one exterior layer, so as to form one layer and part of the next on the inside. In modern armatures, by the best makers, of not too high E.M.F., only one, two, or three layers are employed, the E.M.F. being made up for by an increased power of the field magnets; with these armatures the winder does not have much difficulty to find room for his inside wire. The wire to be wound on each section should now be doubled on itself and wound round the finger into two long coils, *A* and *B*, as shown in Figs. 2 and 3.

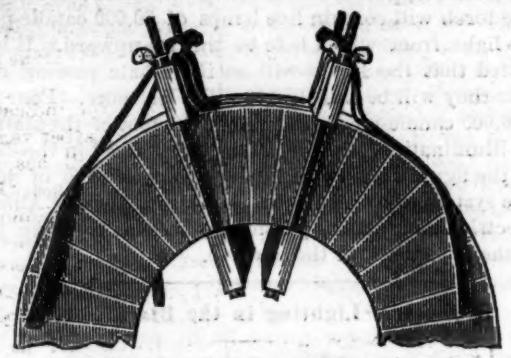


FIG. 1.—ARMATURE WINDING.

First, coil *A* is taken and passed over, round and through the core, and the wire pulled tight and straight, a light hammer being used if necessary (Fig. 4). Second, coil *B* is taken and passed under, through and over the core to the front again (Fig. 5). Third, coil *A* is taken again and passed over, round and through to the front, similarly to the first operation (Fig. 6). The second operation is then repeated, and so on alternately till one layer of the first section is wound. These turns are brought close up

FIG. 2.

to the left-hand guide, and the turns kept as close together as possible by using a hammer and blunt wooden wedge, if necessary. To make the winding clear, each operation is shown in Figs. 3 to 6; the dotted lines represent the wire behind the core and the turns *A* and A^1 have been wound off coil *A*, and B^1 off coil *B*, and in the direction shown by the arrows. After a coil has had its turn, it is either held tight by an assistant, or a few turns are taken round something so that which has already been wound may not get loose while the next coil is being wound from. When the first layer of the first section is wound, we leave that section and wind the first layer of the second section, and after that the first layer of the third section, and then return to wind the second layer of the first section, and so on till we reach the last layer, when each section has its ends twisted together. The right portions of the two pieces of tape are now taken over the finished left-hand guide, and securely fixed so as to keep the coils in place while the left-hand guide is being removed; it is then placed three sections to the right (see Fig. 7) and the fresh tapes placed, as shown, for fixing the next batch of coils wound. When the pieces of tape are no longer required, they are cut off level with the winding.

If the armature to be wound is of the Siemens type, the figures would be the same with the exception that the winding would be carried right round the core (the shaft being in position), and the guides would be pieces of hard wood or metal inserted in saw cuts in the core. Coils *A* and *B*, Figs. 2, 3, 4, 5 and 6, may be wound on shuttles where there is sufficient room for them to pass. A varnish of shellac and methylated spirits is spread over each layer after it is wound, increasing the insulation and binding the turns together.

It will be seen from the great difficulty of winding many layers on an armature, keeping the top layers true and finding room for the inside ones, what a great mechanical advantage there is in employing *a large armature* with one layer instead of employing a smaller armature with many layers.

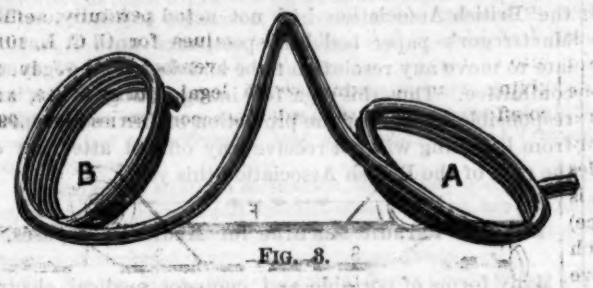


FIG. 3.

The Voyage of the "Volta."*

Although no exaggerated value, either scientific or technical, is said to be attached by the owners to the experimental trip of the "Volta" across the channel last Monday week, the feat is one which they may well be proud of, and the notice it has attracted in the press cannot fail to add greatly to the reputation of Mr. Reckenzaun, who was responsible for all the electrical arrangements of the expedition. If the good people of Dover really imagined that the "Volta" was about to be put in competition with the "Calais-Douvres," these modest disclaimers on behalf of the electric launch are perhaps not uncalled for; but the voyage was not made for nothing, and Mr. Reckenzaun is probably more confident than he

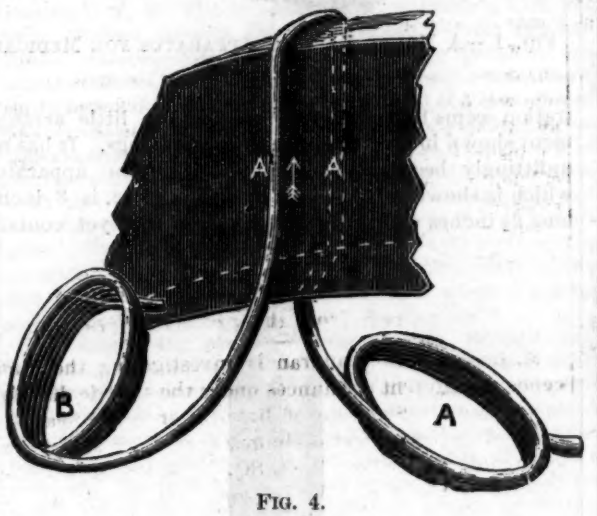


FIG. 4.

cares to own that the propulsion of boats by electricity will soon cease to be a day's wonder, and will eventually take its recognized place among the practical modes of marine locomotion. At all events, there are several ways in which already it may be conjectured that electrical navigation will establish its superiority over steam; and some of these are indicated by the results of this voyage from Dover to Calais and back.

In the first place, the "Volta"—which may be taken as a type of what boats of her class will be—is undecked, and her accommodation for passengers or merchandise is, therefore, greater than that of any boat of similar dimensions driven by steam power, and carrying the requisite supply of coals. At the same time it is needless to say that an open boat of this description is not adapted for the sea except in very calm weather. Her batteries are stowed away where fuel could not be accessible; and her motors take up far less room than the engine, boiler and funnel of an ordinary steam launch. Next, there is the avoidance of all those annoyances to passengers which are the invariable attendants of steamboat traveling, even when the journey is short and the water smooth. The "Volta" makes progress without any disagreeable vibration, and with no smoke or bad smells. The noiseless way in which she glided on the water the other day was demonstrated by one of the crew laying hold of a sleeping sea gull, whose slumbers had not been disturbed by the approaching boat. And, lastly, the speed at which a launch of this description would be propelled on ordinary occasions is as great as that of the average steam launch, but can be increased beyond anything a fast sailing steamer is capable of if special occasion call for it.

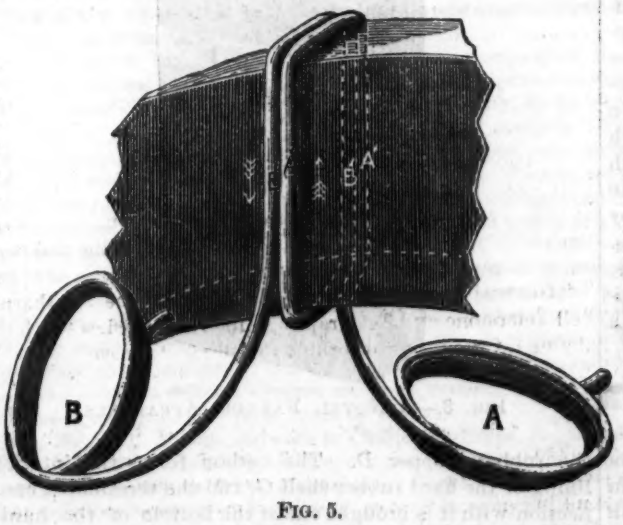


FIG. 5.

When the steamboat was first constructed, its employment seems to have been confined to inland waters or narrow streams; and even as late as 1812, some fourteen years after Miller's first experimental boat on Dalswinton lake, Dumfriesshire, the more ambitious designs of Fulton in America were only employed as ferry boats, their speed not exceeding seven miles an hour. Probably for some

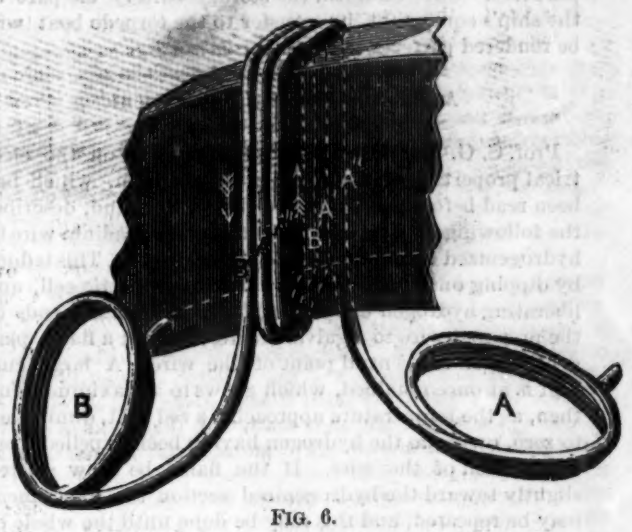


FIG. 6.

little time to come the electrical boat will confine itself to the same narrow sphere of operations, its usefulness being at present limited by the necessity of plying between fixed points, not very remote, where fresh fuel—or more exactly a fresh charge of electrical energy—may be taken in. Subject to this condition, however, an objection which effectually hindered the progress of steam navigation on rivers and canals will not apply to the electrical boat. Symington's steamboat was interdicted on the Clyde Canal in 1801 on account of the motion destroying the banks. The modern steam launch has gained an ugly notoriety on this very account, as well as for its obtrusive ugliness on rivers devoted chiefly to pleasure. The "Volta" might navigate any canal in the kingdom, or the most crowded part of the Upper Thames without provoking a single imprecation, and her "wash" is said to be comparatively harmless.

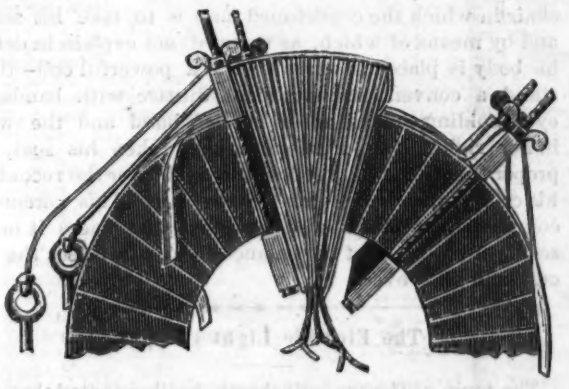


FIG. 7.

If the expense of working can be kept within reasonable limits, we believe there is a wider sphere of usefulness open to electrical boats of the "Volta" type; and her passage across the Channel will firmly establish public confidence for journeys of more limited extent. In some cases the water power of rivers to be ferried might be utilized for charging the batteries, and the expenses reduced to a minimum; but under even less favorable circumstances the capacity of the secondary battery is being so greatly enlarged that we may confidently anticipate a speedy reduction in the cost of this description of motive power. Mr. Crompton's remarks on this head at the British Association meeting were most encouraging. The batteries on board the "Volta," weighing only two tons, enabled her to do the double journey, occupying more than eight hours; and probably it could have been easily extended to ten. If this is a fair measure of her traveling capacity, the utilization of such boats for the navigation of certain rivers is almost a matter of certainty. Competition with steamboats may be out of the question, but it is easy to see that the many advantages of electrical navigation will establish it where steam has hitherto been inadmissible, and in some cases may supersede the existing steamboat service, at all events for ferrying purposes.

To the more serious business of propelling torpedoes by electricity, a good many people are now devoting their serious attention, and probably this recent performance of the "Volta," will give an impetus to the idea. When steam navigation became a practical reality it was sagely predicted that its adoption would diminish the chances of

* London *Electrician*, Sept. 24, 1886.

war by increasing the certainty of destruction, and "proportionally lessening the desire for battle." It is certain that naval engagements have been fewer since the general application of steam; and there is a widespread suspicion that the modern ironclad will be very shy of coming to close quarters. If there is any truth in this, "the desire for battle" will be still further cooled by the perfecting of the torpedo as a swift and deadly implement of naval warfare. Electricity as a mode of propulsion would undoubtedly add much to the terrors of this silent messenger of death, and if certain difficulties were overcome in regard to the storing and charging of the batteries, their obvious superiority over steam power would insure their adoption for torpedo warfare. Possibly these difficulties may gradually disappear through the growing application of electricity on board ships of war for electric lighting purposes. Once establish the storage battery as part of the ship's equipment, its transfer to the torpedo boat will be rendered perfectly easy and trustworthy.

A Thermo-Electric Experiment.

Prof. C. G. Knott, in the course of a paper on the electrical properties of hydrogenized palladium, which has been read before the Royal Society of Scotland, describes the following curious experiment: Let a palladium wire be hydrogenized throughout one-half its length. This is done by dipping one-half the wire into an electrolytic cell, and liberating hydrogen upon its surface. Attach the ends of the prepared wire to a galvanometer, and let a flame play gently upon the central point of the wire. A large current is at once obtained, which grows to a maximum, and then, as the temperature approaches a red heat, diminishes to zero, owing to the hydrogen having been expelled from this portion of the wire. If the flame be now shifted slightly toward the hydrogenized section the experiment may be repeated, and this may be done until the whole of the hydrogen has been driven from the wire, or until the gas has become equally distributed throughout its length. At the same meeting Mr. Thomas Andrews communicated a paper on the electro-chemical relations between metals and fused salts.

Capital Punishment by Electricity.

There is now being exhibited at Leipzig, says the London *Electrician*, an apparatus for putting criminals to death by electricity. So long as it is found necessary to retain capital punishment upon our statute books it may well be that the electric method is the most merciful and least repulsive process that could be devised for carrying the sentence into effect. But if such means are ever adopted in this country the details will certainly not be carried out in the theatrical manner which commends itself to the Leipzig amateur. In this apparatus, behind the chair in which the condemned man is to take his seat—and by means of which, as we need not explain in detail, his body is placed in circuit with a powerful coil—there stands a conventional figure of Justice with bandaged eyes, holding the balance in her left hand and the sword in her right. The criminal having taken his seat, the proper functionary is supposed to read over the record of his crimes and the sentence of the law. This ceremony completed, he folds up the document and places it in the scale pan, the arm of the balance descends, closes the circuit, and all is over.

The Electric Light in Spain.

The town of Gerona will shortly be illuminated throughout by the electric light. The motive power will be supplied by two turbines, situated about the centre of the town. The available water force is equal to about 90 horse-power, of which only 25 will be required. The installation will consist temporarily of 200 incandescent lamps, which will be lighted for 10 hours a night, and for each of which the town will have to pay 75 centimes. Besides these, 10 Gramme arc lights are already in use. These are fed by the secondary currents of four Zipernowsky transformers. The distributing circuits, which are of plain copper wire, are carried overhead upon wooden poles. In case of accidents to the turbines the dynamos will be worked by a steam engine, which is kept in reserve.

Protection from Lightning.

Mr. MacGregor, a gentleman who has spent many years in India as chief superintendent of telegraphs of the Assam division, wished, in his paper presented to the British Association last month, on the "Protection of Life and Property from Lightning," to arouse the public from the helpless indifference with which we still submit to the damage that atmospheric electricity inflicts upon us. While in France and Germany societies and private persons have long watched the course of the storms, and have established many an interesting fact, no organizations of this kind exist in England. Mr. MacGregor spoke in avor of the establishment of a society to facilitate the xchange of information and ideas between members of the arious scientific bodies, building guilds, insurance comnies, and other bodies and persons interested in saving life property, the general principles of the society to be cosmopolitan. Such an association was necessary to see that the simple rules, the outcome of patient experiments extending over 130 years, were not only published, but also judiciously applied. Nature had in so far favored Mr. MacGregor, says *Engineering*, that she provided violent thunder-storms for Birmingham on the day when most members of the association were out on excursions; but the British Association had not acted so kindly, as Mr. MacGregor's paper had been postponed until it was too late to move any resolution to be laid before the general committee. Thus this plea for inaugurating a new and responsible society for the protection of life and property from lightning will not receive any official attention on the part of the British Association this year.

A Novel Faradic Machine for Medical Purposes.

Many forms of portable and compact medical electric apparatus have been designed, but the climax of concen-

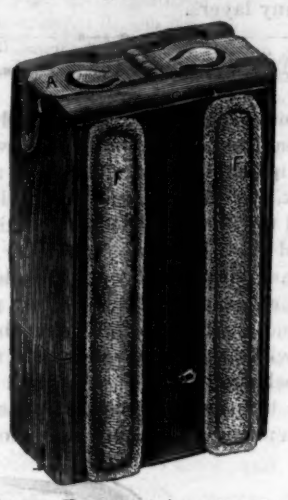


Fig. 1.—A Novel Faradic Apparatus for Medical Purposes.

tration seems to have been reached in the little arrangement shown in the accompanying engravings. It has not unfittingly been named the "Gem." The apparatus, which is shown in two views in Figs. 1 and 2, is 3 inches long 2½ inches wide and ¾ inch thick, and yet contains

Fig. 2.—Cell of Faradic Apparatus.

within itself the entire complement of parts including battery, vibrator and coil, and the electrodes.

The battery consists of two small cells, one of which is shown full size in Fig. 3. It is a zinc-carbon cell, in which the zinc in the shape of a short rod is supported by

Fig. 3.—A Novel Faradic Apparatus.

the rubber stopper *D*. The carbon forms the interior lining of the hard rubber shell *G*, and the terminal in connection with it is brought out at the bottom of the hard-rubber case. The zinc terminal in a like manner is brought out at the top of the stopper. The solution used is bisulphate of mercury, a small quantity of which is dropped into the cells filled with water.

Two such cells are employed, and they are inserted in opposite direction into holes in the case covered by the brass clips *A*, Fig. 1. The connections are so made that the act of insertion of the cells puts them in circuit in series with the coil and vibrator at the other end of the case, which is covered with glass as shown in Fig. 2.

The vibrator is started by moving the lever *E* towards the glass plate, which brings the armature into action. Means are also provided for varying the intensity of the current. A bare resistance coil of German silver is placed opposite the slide *C*, Fig. 2, and by moving the latter in one direction or the other a corresponding resistance is introduced or taken out of the primary circuit of the coil.

The electrodes *F*, *F*, Fig. 1, finally, are attached to the sides of the case. They can be slid off and soaked in water, and make contact in the act of replacing.

This ingenious little combination, which can easily be carried in the pocket, is manufactured by F. G. Otto & Co., of this city. One charge of the cells, it is claimed, will furnish current for an hour.

Lighting the Statue of Liberty.

In accordance with the announcement already made in these columns, it is stated that Gen. Charles P. Stone, who, until the Government took charge, was the engineer directing work on the Bartholdi statue, has, after much investigation, recommended a system of electric lighting for the unique light-house, and that his recommendation has been approved by the Government officers. The apparatus to provide the light consists of 1 dynamo complete, 13 duplex-arc lamps, and 14 50 candle-power incandescent lamps. The torch will contain five lamps of 30,000 candle-power, the light from which is to be thrown upward. It is predicted that the lights will so illuminate passing clouds that they will be visible 100 miles or more. Four lights of 6,000 candle-power each go at the foot of the statue for its illumination. Incandescent lamps fixed in the diadem on the figure's head will lend the appearance of jewels. The system to be used is the American, and the American Electric Manufacturing Company intends to make a gift of the apparatus for the purpose.

Electric Lighting in the Black Forest.

To find the luxuries of a London drawing-room on the side of some rugged mountain which our forefathers could have viewed with nothing but aversion, writes a correspondent, no longer causes surprise to any one. But there is a certain sense of anomaly in meeting in some remote region with a form of lighting which has been actually rejected in the city of London as too expensive an indulgence. To climb up thousands of feet by means of a railway which has obviously the hardest work to get along, and to penetrate into the heart of a vast assemblage of granite hills such as the Black Forest, and then to find a village street lined with these lofty posts which have scarcely yet become familiar to the capitals of Europe and to drive in a flood of artificial moonlight, strikes one at the first moment as a little strange. Obviously, however, electric lighting is specially adapted for mountain districts. Rushing streams and tumbling cataracts supply working power in the most economic form, and reduce the expense of the new light to little more than the cost of the original apparatus. It seems to be an accepted view now that when gas or fuel is used to set in motion the dynamo machines which produce the electric current, about the same amount of combustible material is consumed as would give a corresponding, or at least a sufficient, light by means of gas. The preliminary expenses of the electric works is so much to be added, and the total cost is thus raised far above that of gas. But when it is merely a question of diverting a fraction of a torrent, or levying a trifling contribution on a waterfall, the motive power is obtained for nothing, and the only permanent expense consists in the renewal of carbon pencils or other lamp apparatus, the wear and tear of machinery, and the expense of superintendence. At Triberg, near the summit of the Black Forest Railway—a place which boasts the best waterfall in South Germany—water is of course plentiful, and advantage has been taken of the fact. The principal streets of the village, which must be nearly half a mile long, are well lighted by nine arc lights or Siemens lamps. The expense of the installation is said to have been 40,000 marks, or £2,000, and the standing expenses are inappreciable. One or two private establishments have also set up electric lights of their own. A bier-halle and a watch manufactory are lighted by incandescent light, and the Lion Hotel has a Siemens lamp in the speise-saal. The installation of this lamp cost 800 marks, or £40, and the only continuing expense consists in a few pfennig per night for renewal of carbons and a small rent for house room paid to a neighboring manufactory in which the necessary water wheel and dynamo are placed. On the occasion of a recent thunder-storm the alarm was raised that the *débris* brought down by the torrent had choked up the channel, and that there would be no light; but after a few eccentric throbs and a short eclipse the lamp resumed its wonted steadiness and brilliancy, in which respects it contrasts most favorably with the arc lights used in one of the most frequented Paris hotels. Another Triberg hotel, not to be outdone, promises shortly the incandescent light throughout its suite of public rooms; and this form of light is already introduced at Tarasp, on the Lower Engadine, and at the new hotel at the head of the Maloja Pass.

Mr. P. B. Delany has received, it is said, $125,000 from the English government for the synchronous multiplex system of telegraphy. The system ought easily to be worth that to the English telegraph service.

NEW YORK NOTES.

Office of The Electrical World,
New York, Oct. 4, 1886.

One of the most prominent of the younger men in the electrical business is Mr. W. H. Baker, who was born so recently as April 13, 1855. He entered the employ of the Western Union Telegraph Company about seventeen years ago as office boy in General Eckert's office (then general superintendent of the Eastern Division). After three or four months' service in that position, he was promoted to the position of clerk to superintendent of the Sixth District, then under the supervision of Mr. A. B. Chandler, which position he held until 1875, when, with General Eckert, Mr. Chandler, Mr. Bates, Mr. Tinker, Mr. Cockey and others, he severed his connection with the Western Union Company and entered the service of the Atlantic & Pacific Telegraph Company, and in that company he held the various positions, from time to time, of transfer clerk, cashier, treasurer and secretary. After the consolidation of the Western Union, American Union, and Atlantic & Pacific companies in 1881, he returned to the Western Union Company and remained with that company until a year ago last May, when he resigned to become the secretary and treasurer of the American Electric Manufacturing Company, from which he resigned last June, in order to avail himself of the long-sought opportunity to engage in the stock brokerage business. On the 23d September he was elected a member of the New York Stock Exchange, and he has made a connection with the long-established and well-known firm of Messrs. R. J. Kimball & Co., Nos. 16 and 18 Broad street, where he will be pleased to receive visits or correspondence from his friends and former associates in the electrical fraternity. He has facilities for the execution of orders to buy or sell on commission, for cash, or carry on margin stocks, bonds and all classes of securities current at the New York Stock Exchange, also for the execution of orders in the Philadelphia or Boston exchanges; grain at the Chicago Board of Trade and petroleum in the New York market. He will also make a specialty of all telegraph, telephone and electric light securities.

Mr. H. N. Curtis, of 32 Nassau street, has secured for the Thomson-Houston Company the franchise for exclusive lighting in the city of Flushing, L. I. Both arc and incandescent lamps will be used, with an underground system. He has also been very successful in equipping the "Temassee" of the Clyde Line to Santo Domingo, and is now fitting up the "Seminole" and "Cherokee," of the same line. Each will take 50 incandescents and a 1,600 c. p. focusing lamp.

I understand from a high authority that the New York Safety Steam Power Company will furnish the engines for lighting the Bartholdi statue.

The Edison Company has just published its latest list of work done. The showing is something tremendous. I think it will be generally admitted that nothing more phenomenal and striking has ever been seen in legitimate industrial development. The circular shows a total of 181,463 lights in isolated plants and 149,900 in central stations, making in all the grand sum of 331,363 lamps actually placed. If the full dynamo capacity of the isolated plants were taken, a total of more than 400,000 Edison lights in use in this country would be seen. The returns cover 10 months, from Oct. 1, 1885, to Aug. 1, 1886, and exhibit the following percentages of increase:

Isolated plants	35	per cent.
Lamps in same	36	"
Central station plants	132	"
Lamps in same	126	"
Isolated plants, increase	182	
" lamps, "	48,588	
Central station plant, increase	33	
" " lamps, "	83,600	

I hear that Messrs. Mackay and Chandler have gone out to Oregon to join Mr. H. Rosener, who has now been on the Pacific Slope about six weeks rushing through the new Postal lines from Vancouver's Land to San Francisco. The lines will be completed by Jan. 1, 1887, when the Postal Company will have very fine through facilities.

The Brush-Swan Company of New England have moved from their temporary offices, 476 Broadway, to a more convenient location, 36 Union Square, East, where, after their wonted genial manner, Messrs. Powell and McFall will be found dispensing some of the good things of this world—in the shape of their electric lights and lighting apparatus.

Mr. W. Marshall, 4 University Building, corner University and Waverly places, this city, is making a new standard condenser of 14 sections or divisions, so as to give any capacity from 4 microfarads down to a thousandth of a microfarad. Thus any fraction can be obtained. The condenser can also be used in sections without trouble, for several different purposes. It will be found most valuable for laboratory or experimental work.

The following spicy item I clip from the New York *World*: "There has always been sharp rivalry between the several electric light companies, but the war waged between the American, of this city, and the Thomson-Houston, of Boston, has been conducted with unusual ferocity. It has reached a point at which, as will be seen by the announcement in to-day's *World*, the New Yorker boldly challenges the Bostonian to a test of the respective merits of the two systems. As the forfeits are to go to the Charleston sufferers we are disposed to urge the Thomson-Houston and all other companies to promptly 'put up or shut up.' The American Company, which issues the challenge, is the one which Gen. Stone and the Light-house Board have selected to light the torch of Liberty. Mr. Goff, the President of the company, on being informed that his proposition to supply the apparatus had been accepted, emulated the example of the *World* and made a gift of it to the Government."

The New York offices of the Harrison Safety Boiler Works, of Germantown Junction, Pa., are at 41 Dey street. I learn that the works are very busy at the present time on orders from Philadelphia, Newark, Brooklyn and other places. The works have received a silver medal from the Franklin Institute, awarded their boilers at the recent exhibition of the Institute. This is the second time the highest honors have been awarded these boilers by the same distinguished body.

W. T. H.

NEW ENGLAND NOTES.

Branch Office of The Electrical World,
Boston, Oct. 4, 1886.

Mr. Isaac H. Davis, junior member of the firm of Westinghouse, Church, Kerr & Company, contracting and consulting engineers, favored this office with a visit on the 29th ultimo.

Mr. W. B. Bird was elected President of the Chemical Electric Light and Power Company, on Friday, Oct. 1, to succeed Gen. S. M. Weld, resigned.

Prof. Geo. H. Hartwell, the well-known lecturer on electrical subjects, has issued an attractive little circular, a copy of which may be had by addressing that gentleman, No. 611 Tremont street, Boston.

Messrs. Jones, McDuffie & Stratton, the pottery and glass merchants, corner Federal and Franklin streets, Boston, are handling a varied line of plain and ground globes for arc lights; and also plain and decorated shades for incandescent lamps.

The Newton, Mass., Electric Light & Power Company has been chartered. Mr. Horace B. Parker is President and Mr. Herbert G. Pratt Treasurer. The capital stock is $20,000.

At Amesbury, Mass., the recently organized electric light company is pushing matters energetically to get its plant in operation by the 15th inst. The poles are now being erected and the wires strung along the principal streets.

The Somerville, Mass., Board of Aldermen held a regular session on the evening of September 28, and the Charlestown Gas Company was given a hearing on its petition to erect poles and place electric light wires in the street from the Boston line to Union Square, as well as in other streets of the city. Treasurer Geo. B. Neal represented the petitioners, the opposition being President Buck, of the Somerville Electric Light Company, and Superintendent Mullekin, of the Cambridge Electric Light Company, each of whom also asks for locations within the city limits.

The newly-chosen board of directors of the Waltham (Mass.) Gas and Electric Lighting Company met on the evening of September 29. An organization was perfected, and Mr. Lowell Clark was elected president and Mr. G. B. Stearns treasurer and clerk. The five new directors were present and qualified. A general committee of six was appointed as follows: C. C. Bills, chairman; M. H. Young, secretary; A. M. Goodale, J. R. Farnum, William Roberts and C. E. Getchell. From this were formed sub-committees as follows: A building committee, consisting of Messrs. Goodale, Getchell and Farnum; a committee to solicit orders for the electric light, composed of Messrs. Stearns and Goodale; committee on new steam apparatus, Messrs. Roberts, Getchell and Goodale. Mr. Bills was authorized to see the Thomson-Houston agents on Thursday, and see what agreement they would stand to. The building committee will meet immediately and stake out the new building for an electric plant. The canvassing committee will have the services of an electrician to introduce the new light. A supplementary application for right of way for poles and wires was adopted, and will come before the aldermen.

Two enterprising young gentlemen, Messrs. Barentzen and Berthrong, have introduced into this city a novel system of taking photographs by electric light. Mr. Barentzen, by the aid of the Weston electric light, arranged in a combination of reflectors to graduate the intense light, coupled with a patent system of finishing, has already taken some excellent pictures, that can be seen at any time. The parlors, No. 11 Park square, are luxuriously furnished, and on the walls are several realistic crayon productions by Mr. Barentzen's partner, Mr. Berthrong.

The Boston offices of the Thomson-Houston Electric Company (Richardson Building), 178 Devonshire street, are being wired for arc and incandescent lighting; the company, of course, using its own systems of lighting. In the basement are two handsome dynamos, fresh from the company's factory; one an arc lighter of nine lights capacity, the other a 150-light incandescent machine.

The new offices, in this city, of the Sawyer-Man Electric Company (known as the Consolidated Electric Light Company) adjoin those of the Thomson-Houston Electric Company on the second floor of the palatial Richardson building. Carpenters are now at work on the fittings and furnishings of the offices, which are to be identically the same in beauty and finish as their neighbor's. Mr. P. H. Alexander, the manager, will be absent from the city until Oct. 15, and will find on his return the new quarters in readiness for himself and his assistants.

Mr. H. M. French, of the Ball Electric Light Company of New England, has increased the plant previously installed in the clothing house of Macullar, Parker & Company, this city, by the addition of the second thirty-arc light "unipolar" machine. The lighting capacity of the plant is sixty arc lights, but only forty-eight were started up on the evening of October 2. Twenty-seven of the lights on the main floor, on a level with Washington street, make the arched and extensive interior resplendent with a brightness that almost rivals that of the noonday rays of "Old Sol." The remainder of the lights are distributed throughout the various departments of the mammoth building, and all burn steadily and clearly. The engineer, Mr. C. O. Putnam, takes a pleasure in showing visitors the electrical and steam plants, and he "points with pride" to the handsome "Brown" automatic cut-off engine and the two small but compact dynamo machines running almost noiselessly with belts only three inches in width.

Mr. A. L. Russell, successor to Charles Williams, Jr., Boston, is enjoying a large and profitable patronage in the line of telegraph, telephone and electrical instruments. Students from Harvard and the Institute of Technology, as well as many other young electricians, daily visit Mr. Russell's manufactory at 109 Court street, and in addition to getting the apparatus they want, they generally obtain some useful information and new ideas.

The United Lines Telegraph Company opened a district messenger service in Holyoke, Mass., on September 29, with fifty boxes up and working satisfactorily.

The hearing in the Erie telephone suits begun at Lowell last spring and continued during the summer until July 8, was to be resumed Oct. 5, but has been postponed to the latter part of October.

Bell Telephone was well supported and in good demand again the first day of the month, on the belief that the decision of the "jurisdiction" question now pending would be favorable to the company. A still further advance is anticipated next week. New England and Erie moved in sympathy. The quarterly statement of the New England Company is now due, and will, it is expected, make a very good showing.

The Lord Acoustic Telephone Manufacturing Company, of Boston, Mass., has been organized, with Mr. Thomas F. Wells, President and Mr. Henry Lunt, Treasurer. This company will operate under the patents of Mr. George W. Lord.

Charles Williams, Jr., for many years identified with electrical enterprises in this section, has decided to make an extended European tour, and expects to sail from New York on October 9. The family of Mr. Williams will accompany him on the long journey, and at least twelve months will be given up by the little party to various spots of historical interest in the Old World.

Happening to be in the neighborhood of the factory of the Eastern Electric Cable Company recently, I dropped in, and found Mr. Clark very busy. He said to me: "Orders for electric light and telephone cables and wires are continually coming in, at such a rate that my works are now running night and day."

The Gamewell Fire-Alarm Telegraph Company of Boston & New York is very busy filling orders for its fire-alarm and police signaling systems.

This company has just completed the installation of its fire-alarm system in the town of Dover, N. H., consisting of two 5-mile circuits, with ten boxes in each circuit. One of the bells connected with this system just installed weighs 3,600 pounds. Some months before this system was adopted by the authorities of Dover, the Cocheco Manufacturing Company had the Gamewell fire-alarm apparatus in its mills. It is said that it was owing to the satisfaction given that corporation that the town authorities decided to use it.

Canadians are excited over the discovery of "a deposit of copper ore of great extent and richness, believed by those who have examined it to be the largest in the world," on the Algoma branch of the Canadian Pacific, south of Sudbury. The ore is declared to be of uncommon richness, and a Montreal paper says: "The best taken from the Calumet & Hecla yields but 4 per cent. of pure copper, while that taken from the new Sudbury deposit yields from 16 to 20 per cent." The work of development has already begun. The element of uncertainty in this great "find" is the cost of mining. The expenses of obtaining copper from the ore are decidedly larger than is the case with the Lake Superior mineral, which has simply to be smelted. The advantage of 16 per cent. would rapidly disappear when the difficulty of working the ore is considered. This is the trouble with the Anaconda and other companies. Then again, such copper would in all probability be low grade.

The Union Glass Company, with manufactory at Somerville, Mass., and offices at 129 Milk street, Boston, claims to be the original maker of arc-light globes in this country. For many years past this company has had a large patronage in this line from the leading local electric light companies in Boston, New York, Buffalo, Chicago, St. Louis, San Francisco, Kansas City, and several other large cities and towns in the United States and Canada. Recently the company has entered largely into the manufacture of shades for incandescent lamps, and these are being made in every imaginable shape to suit the demand.

The Thomson-Houston Electric Company made the following magnificent output of its arc and incandescent systems during the month just passed:

ARC LIGHTS.

Montpelier, Vt	30	New.
Salem, Mass	120	Increase.
Brooklyn, N. Y	45	"
Carnegie Bros., Pittsburgh, Pa	66	New.
Hoboken, N. J	45	Increase.
Turner's Falls, Mass	30	New.
Amoskeag Mfg. Co., Manchester, N. H	45	"
Fitchburg Worsted Co., Fitchburg, Mass	30	Increase.
Rutland, Vt	45	"
Mobile, Ala	45	"
Lafayette, Ind	45	"
Adrian, Mich	45	"
Danville, Va	30	"

INCANDESCENT LIGHTS.

Norwich, Conn	300	New.
Bangor, Me	300	"
Asa Cushman & Co., Auburn, Me	600	"
Day Cordage Co., Cambridge	50	"
Webster & Bond, Dodge City, Kan	250	"
Woonsocket, R. I	300	"
Terre Haute, Ind	600	"
Mahoning Valley Iron Company, Youngstown, O	200	"

The Siebert Cylinder Oil Cup Company, of Boston, in connection with its useful oil cup, is handling in New England the valuable goods of the Vulcanized Fibre Company, of Wilmington, Del. The attention of the electrical fraternity has already been drawn to the meritorious features of hard, red vulcanized fibre, which is really invaluable for many electrical and mechanical purposes. Samples of these goods, in sheets or tubing, will be furnished on application, together with Catalogue "C."

Steel rim pulleys are a comparatively new article on the market. They are light and durable and are likely to come into very general use. They are to be had in Boston of S. C. Rowell & Co., 135 Pearl street, Boston, Mass.

The Portland Belting Company has purchased the stock and machinery of H. W. Race. G. H. Foster, the proprietor, has had a long practical experience in the manufacture of belting in Worcester, Mass.

The American Supply Co., Providence, furnished the main belt for the new Orswell mill, at Fitchburg. It is a 30-inch double belt 110 feet long. This firm are busy in all their different departments, and they cover almost everything in the line of mill, factory and station supplies.

W. I. B.

WESTERN NOTES.

Branch Office of The Electrical World,
Chicago, Oct. 2, 1886.

The general business tone throughout the West remains good, and I hear of activity in every line of electrical industry. The telegraph companies report their lines worked well up to the full capacity, the telephone companies have a steady demand to meet for instruments, and electric light plants are being installed on every hand. A large amount of fine building is also going on that creates a brisk market for electric bells, electric gas lighting apparatus, temperature regulators, and all the thousand and one devices for convenience and comfort in which electricity plays a part.

The innovation of electric railways is arresting a good deal of attention out our way, and the Van Depoele people, who have done considerable pioneer and missionary work in this line, are kept busy answering inquiries and drawing up plans for new roads. A new car has just been added to the equipment of the Appleton road, making five in all run by electricity there, and utilizing water power. As to the Van Depoele road at Port Huron, the following ordinance under which the line goes into operation will be of interest:

An Ordinance to Amend an Ordinance entitled an "Ordinance Relative to the Port Huron Railway Company."

The Common Council of the City of Port Huron ordains as follows:

SECTION 1. Section Five of an ordinance relative to the Port Huron Railway Company is hereby amended so as to read as follows:

The cars to be used on said railway shall be drawn by animals, or they may be propelled by electric motors, and for such purpose said company may erect such poles as are necessary along the sides of streets, and may stretch wires across the streets and string or suspend wires therefrom over the length of their line above their track. Cars shall be drawn or propelled at a rate of speed not exceeding six miles an hour, and shall be run as often as public convenience shall require, and shall run for at least fourteen hours every day from the 15th of April to the 15th of October, and at least twelve hours every day from the 15th day of October to the 15th day of April. The rate of fare for each person on any one route shall not exceed five cents, and the whole length of road authorized by ordinance shall be deemed one route, provided, however, that when cars or carriages are hired for a specific purpose or time, the rate herein fixed shall not apply.

SEC. 2. This ordinance to be void unless said railway company shall accept the same in writing within thirty days.

The Jarvis Engineering Company, Boston, Mass., have received the contract for setting the tubular boilers for the Edison Illuminating Company, Topeka, Kan., with the Jarvis patent boiler setting and National rocking grates. They will also use four Armington & Sims Company engines.

Detroit is the centre of considerable electrical activity. It is just announced from that quarter that the Detroit Motor Company has been formed there with a capital of $100,000, by F. A. Blades, lately collector of the port, I believe; E. T. Hance, J. T. Leggett, W. C. Maybury, J. H. Jones, W. E. Robinson and A. T. Hill. It is said also that more than half the capital has already been paid in. The company will do a regular motor business, and has already, I hear, several motors running.

Judge Bagby, in the Circuit Court, on Oct. 1, decided the case of the bucket shop known as the New York and Chicago Grain and Stock Exchange against the Board of Trade, by which the former sought to prevent the big board from cutting off their market quotations or removing the tickers from the bucket shop. The suit was one of 10 or 12 of a like nature, and has served as a test case. Following the view of the State and Federal courts, that the Board of Trade is a private organization, an association of members for their own advantage, Judge Bagby held that the quotations collected by the board are its private property, the use of which it has absolute power to direct. It could, he said, no more be compelled to give away its information than could a business house or private person under similar circumstance. The scope of the bill sought was to compel the Board of Trade to discriminate against its own members. The injunction would therefore have to be dissolved and the bill dismissed.

The Ness City, Kan., Telephone Company has been formed by Mr. N. S. Calhoun and others with a capital stock of $10,000. I don't know the objects of the company yet, but I commend its modest capitalization.

The West Electric Cure Company is also announced with a capital stock of $10,000; incorporators, Henry W. West, Albert Brickwood, Edmund S. Byers. W. A. K.

THE TELEGRAPH.

T. M. B. A.—Assessment No. 201 has been made, for October, to meet the death claims of N. T. Wallis and James Hall. Notice has been given that the annual meeting will be held in this city on November 17.

Stay of Proceedings Continued.—In Supreme Court, Chambers, last week, Judge Andrews decided to continue, pending an appeal by the United Lines Telegraph Company, the stay of proceedings under the judgment foreclosing the $300,000 mortgage on property of the defunct Bankers and Merchants' Telegraph Company.

South American Cables.—A dispatch of Oct. 4 from San Juan Del Sur says: Telegraphic communication via the lines of the Central and South American Telegraph Company was re-established yesterday, having been interrupted since Sept. 15. The shore ends of the cables at this place were washed out by a mountain torrent, and the cables and cable landing were covered by logs and *débris*. This was followed by a high tide and surf, placing the cables beyond reach. The telegraph company's repair steamer "Retriever" restored communication a few hours after her arrival.

THE TELEPHONE.

Germany.—Halle and Breslau are now connected by telephone.

Cuba, West Indies.—The Knudson-Ellsworth telephone appears to be meeting with favor in Cuba. A large order was shipped last month and more go this week.

Acoustic Telephony.—The Lord Acoustic Telephone Manufacturing Company, of Portland, Me., has a capital stock of $250,000.

Providence, R. I.—It comes on good authority that a movement is on foot by which the American Bell Telephone Company will shortly acquire the Providence territory, which is one of the largest and most prosperous exchanges in the country, having more than 3,000 subscribers, and constantly increasing. The Bell company at present has no interest in the stock of the Providence company, although the latter is one of its licensees.—*Boston Herald.*

Points on Stocks.—Speaking of telephone stocks, the Boston *Herald* of Oct. 2 says: "Cincinnati was a buyer, and the street, ever quick at points, sees in this a probability that the court will sustain the company on the question of jurisdiction pending in the famous government suit. Bell telephone is earning close to 20 per cent. on its capital. New England telephone gained ½ to 41. The company is earning 3½ per cent. on the $7,000,000 of capital and a moderate surplus, and maintaining the condition of the property."

Brooklyn's Police System.—Supt. of Police Campbell and Supt. of Police Telegraphs Mason both spoke in the highest terms of the police telephone system to a *Herald* reporter last week. With one appropriation of only $5,000 at his disposal, Police Commissioner Carroll started two months ago to test the signal booth system. Under his direction Mr. Frank C. Mason, the superintendent of police telegraphs, erected sixteen boxes in the First precinct and connected each by wire with the station house in Adams street, near Myrtle avenue. There has been ample opportunity to test them since, and all the police officials are unanimous in their praise of them. "They have been a great success," said Superintendent Campbell, "and it is a great pity we haven't got them in every precinct in the city. However, that must come very shortly, for our experience with the booths in the First precinct has shown the necessity of having them in every precinct. They are a great adjunct to the police system and increase its efficiency a thousand fold."

THE ELECTRIC LIGHT.

Spanish Bull Fights.—At San Sebastian the bull ring has been provided with a Brush installation.

Wilmington, Del.—The Wilmington City Electric Light Company will put up two new central stations.

Morrison, Ill., contemplates putting in an electric light plant to be run by water-power. Mr. H. R. Sampson is interested.

Mt. Vernon, O., is to have electric lights. Mr. W. C. Culbertson is the mayor, and Mr. S. H. Peterman president of the city council.

The New Mather Factory.—The new factory of the Mather Electric Light Company, at North Manchester, Conn., will be 40 by 250 and two stories high.

Lighting the Way to the Ferries.—It has been ordered by the Board of Aldermen to provide electric lights at the approaches to all the ferries south of Canal street, this city.

Manchester, Eng., is to have a grand exhibition next year, toward which a fund of $700,000 has already been subscribed. "It is the desire of the management that especial attention be paid to electric lights and other branches of electric science in which England is far behind America."

The Metropolitan Opera House.—Mr. Stanton, the manager of the New York Metropolitan Opera House, thinks highly of the electric light. In describing last week the preparations for the coming season, he said: "Besides all this I must tell you that new electric lights, which will lend a wonderful effect to many of the scenes, have been made for us in Dresden. Eventually we hope to dispense entirely with gas on the stage."

Awarded First Premium.—Under the supervision of J. G. Cashin, Superintendent of the Sacramento Electric Light Company, the Brush system of lights was awarded the first premium at the late State Fair. The general opinion was that it was the best arranged light in the hall, and gave complete satisfaction. Every one stated that the Pavilion had never been so well lighted. —*Sacramento Bee.*

Mr. Vanderbilt's New Yacht.—The yacht "Alva," belonging to Mr. W. K. Vanderbilt, has been launched, and will soon be ready for sea. She is the largest pleasure craft in the world. She is equipped with electric lights, telephones and telegraphs. All she needs to complete her electrical apparatus is a Reckenzaun launch like the "Volta," to be charged when occasion requires by her lighting dynamo.

Greensburg, Pa.—The People's Electric Light Company, of Greensburg, have started to work, and will soon have their plant under headway. It will cost about $17,000, and is known as the 1,000-lamp plant of the Westinghouse system of electric light. They will have two engines of seventy-five horse-power and two dynamos, and will string about five miles of wire. They are now negotiating with the Sisters of Charity to light the new college building now in course of erection. Should they succeed it will necessitate the addition of another dynamo.

APPLICATIONS OF POWER.

Newark, N. J., will probably soon have a street electric railway in operation.

Newton, Mass., is discussing a street railway to be run by electricity.

Sheffield, Ala., contemplates the construction of an electric railway to be running early next spring.

Fort Wayne, Ind.—The Riverside Street Railway Company, of Fort Wayne, has been incorporated to operate surface lines in that city by electricity.

Los Angeles, Cal.—The Los Angeles Electric Railway Company has been incorporated with a capital stock of $300,000, by C. H. Howland, E. Bouton, M. Santee, S. W. Church, and T. E. Beatty.

Power and Light.—The New England Electric Power and Light Company, Portland, Me., has been organized with a capital stock of $1,000,000. The president of the company is Mr. John E. May, of Boston.

Framingham, Mass.—The survey for the Chandler electric suspension cable road between South Framingham and Framingham Centre is nearly completed. The proposed road is nearly two miles long. It is said that the cars are to be lighted by electricity from the cables.

The Prang Educational Company, in Boston, have a Sprague motor running circular saw, lathes and wood-working machinery in their factory. They say: "As far as we can judge, from the time it has been in use, it does all that is claimed, and, for our work, is much superior to steam power." It is 5 h. p.

Pittsburgh, Pa.—The Electric Motor Railway Company held a large meeting of its stockholders at Hammel's Garden, on Mount Oliver, last Monday night. The object was to get their opinion as to increasing the indebtedness of the company. By an unanimous vote it was decided to do so, and $60,000 worth of bonds will be issued at once.—*American Manufacturer.*

Increase of Manufacturing Facilities.—The Sprague Motor Company has been buildings its motors, by contract, at Bergmann's and the Edison Machine Works, but both these establishments are now so busy on their regular work they cannot keep up with the orders increasing so rapidly for the Sprague machines. The company has, therefore, decided to manufacture for itself, and is about closing a lease for a large building on the West Side, where it will at once begin operations on a very extensive scale.

Power by Wire.—The *Iron Age*, discussing the leading features of the new motor industry, says: "The business is one capable of enormous expansion, and now that activity in that direction has fairly begun we may look forward to many and new applications." The *Iron Trade Review*, on the same subject, says: "With such facts before us, we may well be prepared to look for extraordinary developments in the matter of power within the next five or ten years."

The Largest Motor Ever Built.—The Daft Company is busy preparing to renew its experiments on the Ninth Avenue Elevated Road, were they were conducted last spring. During the summer Mr. Daft has been superintending the construction of a larger motor than the one that was then used. It will be the largest electric motor of this kind that has yet been built, and will represent about 125 horse-power. The one used in the spring could exert about 60 horse-power and it weighed nine tons. The experiments with it, Manager Hawkesworth says, were entirely satisfactory as showing the practical working of the motor, but it was not sufficiently powerful. It could pull two cars as easily as any steam motor, but more than that weighed it down. It is expected that the new motor will draw four or five cars as readily as the present engines do. The motor will be placed in the cab "Benjamin Franklin" and a series of experiments will begin in about a week. Before the end of the month Mr. Daft expects to have everything ready for a public trial of the motor.

PERSONALS.

Miss Nellie Welsh has full charge of the telegraph office at Point Arena, Cal. The remarkable thing about this is that Nellie is but 11 years old, and is said to be the youngest telegraph operator.

Mr. John W. Mackay left this city on Saturday last for Portland, Ore. He will be joined in Chicago by President Chandler, of the Postal Company, and both will proceed to the Pacific coast for the purpose of completing a system of telegraph lines already started by Vice-President Rosener.

Mr. Madison Buell, the repeater chief of the Western Union at Buffalo, delivered a lecture last week before the local electrical society on "The Genie Elektron." The lecture was of a highly imaginative and yet instructive nature, and dealt with the various manifestations and applications of electricity. It was heard with pleasure by a large audience.

Mr. Geo. S. Bowen.—Speaking of the career of the members of the old Chicago dry goods house of Bowen Brothers, the Chicago *Tribune* says: "George S. Bowen was noted for his honorable, straightforward business methods and his earnest desire for the advancement of the city. He was elected President of the Young Men's Library Association, and, after the fire, was one of the originators of the Exposition. He also sent around a petition calling for a meeting of the citizens to be held at Plymouth Church—now St. Mary's—to ask the Legislature to tax property to support a free library in this city. This was one of the first moves toward establishing a public library in Chicago. Mr. Bowen was also one of the builders of the Chicago & Pacific Railroad to Byron, Ill., and when he moved to Elgin was made Mayor of the city. He is now manager of the Equitable Gas-Light & Fuel Company." Mr. Bowen is also interested in various electrical applications.

SPARKS AND FLASHES.

Not in Their Inside.—The wire worm has appeared in the province of Quebec, but the telegraph companies are not afraid of it.—*Pittsburgh Chronicle.*

Used to that Sort of Thing.—During a thunder-storm recently in a town up in New York State a man hurrying to shelter was knocked senseless by a flash of lightning. He was taken into a hotel, and after he had been labored with for some time he recovered. Struggling to his feet he gazed upon the anxious faces surrounding him, and remarked with an air of severity: "Gentlemen, if order has been restored, we will proceed with the game."

Accommodating but Exasperating.—Very Busy Merchant (hears bell ring)—Hello! Whatcher want? Hurry up; I'm busy.

Voice From Main Office (sweetly)—Hello! Is that fifteen seventy-two?

V. B. M. (nervously)—Yes, 'tis. Whatcherwant?

V. F. M. O. (more sweetly)—D-i-d y-o-u s-a-y t-h-a-t w-a-s fi-f-t-e-e-n s-e-v-e-n-t-y-t-w-o?

V. B. M. (excitedly)—Y-e-s-s! DoyouthinkIamagoingtofoolalldayatthis'phone? Whatcher want?

V. F. M. O. (still more sweetly)—W-e-l-l, I w-a-s j-u-s-t t-e-s-t-i-n-g y-o-u-r 'p-h-o-n-e. G-o-o-d b-y-e.—*Judge.*

MISCELLANEOUS NOTES.

Electricity in Warfare.—The Russian government has undertaken an extensive series of experiments on the employment of the telephone and also of the arc light for military purposes.

Magnetite.—For experiments with magnets, pulverized magnetic oxide of iron is, for some reasons, to be preferred to iron filings. The scientific name for the substance is magnetite. It

may be pulverized so finely that the lin s of force of even a weak magnet can be well studied.

The Edison "Polyform" Company has been organized at Kittery, Me., with a capital stock of $500,000. The president of the company is Mr. R. C. Stevenson. It is said that the polyform is some sort of curative compound for neuralgia and other ills to which flesh is heir in "prohibition" as well as other states.

Electric Gas Lighting Litigation.—In the United States Circuit Court at Boston, last week, a hearing was begun in the case of the Boston Electric Company vs. Charles E. Fuller. This is a suit in equity brought against the defendant for an alleged infringement of patent 230,590, granted July 27, 1880, to George F. Pinkham, assignee of Jacob P. Terrill, the inventor. J. E. Abbott appeared for the complainant and E. P. Payson for the defendant.

"The Elements of Static Electricity" is the title of a new work by P. Atkinson, A. M., Ph. D., to be published from THE ELECTRICAL WORLD office. A portion of the work appeared some time ago in these pages and attracted much attention, and the whole is the latest expression of the author's ideas on a subject of which he is admitted to be a master. His views are the result of many years' experience in the class-room, the lecture-room and the laboratory. Further particulars, as to size, price, etc., will be given shortly.

A High Meteorological Observatory.—The Austrian Government, heeding the protests of scientific men against low lying sites for meteorological observatories, has just completed a structure at Salzburg, in the Austrian Alps, at an elevation of 10,000 feet. It will be telegraphically connected with the central office by wires crossing a glacier. The mountain has been chosen owing to its being a famous centre of electrical disturbance, and the workmen who have been engaged in building the observatory are said to have had numerous opportunities of watching the way in which lightning behaves as seen from above the clouds. For greater security the building has a copper roof.

The Special Delivery System.—The extension of the special delivery system so as to include all kinds of mailable matter, books, paper and such merchandise as the postal regulations admit of being mailed, went into operation on the 1st of this month. As the knowledge of the extension of the service is at the present time almost entirely limited to Post office officials, there has been no marked increase in this particular service here, and it is not expected that there will be. The increase will come at the minor offices of the country in the quantity of matter mailed from here, and may prove of considerable convenience to merchants or to people visiting the city, and desirous of mailing goods to friends at home at a saving over express rates. The local service may possibly be increased to the disadvantage of the district messenger companies of the city, as goods mailed with full postage prepaid and the special delivery stamp attached will be delivered at once. A more rapid delivery than by messenger boy is thought probable, as the delivery will be by the supplementary carriers, who are older and more energetic than the average messenger boy.

STOCK QUOTATIONS.

The following list, compiled by Mr. W. H. Baker, 16 and 18 Broad street, gives the current quotations of electrical stocks:

	Oct. 5, 1886. Bid.	Asked.
TELEGRAPH.		
American District Telegraph	.....	44
American Telegraph & Cable	76	77
Central & South American	75	100
*Commercial Telegram	.....	.....
*Gold & Stock	.....	95
*International Ocean Telegraph	.....	95
New York Mutual	65	70
Pacific & Atlantic	45	55
*Postal Telegraph & Cable	.....	.....
Southern & Atlantic	65	75
Western Union Telegraph	77	77⅛
Western Union Scrip	65	.....
Western Union Bonds	123	.....
Mutual Union Bonds	85	86
TELEPHONE.		
American Bell	206	207
American Speaking	100	130
Erie	26	27
*Hudson River	.....	55
Mexican	1⅝	1⅝
*New York & New Jersey	75	80
New York & Pennsylvania	25	30
New England	40¼	41
*Southern Bell	100	130
ELECTRIC LIGHT.		
*American Electric	15	16
*Brush	.....	.....
*Brush Illuminating	.....	.....
*Consolidated	.....	.....
*Daft	.....	100
*Edison	100	130
*Edison Illuminating	.....	.....
*Edison Isolated	.....	50
*United States	40	50
*United States Illuminating	40	50
MOTOR.		
*Daft	.....	.....
*Sprague	600	.....

* These stocks are so seldom dealt in that it is difficult to give prices at which they can be bought or sold. The figures given are as near as can be ascertained.

BUSINESS NOTICES.

Factory Property for Sale.—Full particulars will be found in our advertising columns of a factory with wire making plant now for sale as a whole, or buildings, machinery and stock separately.

Electrical Appliances.—The Cleverly Electrical Works, 1,018 Chestnut street, Philadelphia, issue an extremely neat and pretty new circular relating to their electrical appliances, and more especially to their electric gas lighters. The whole circular is, in fact, very cleverly done.

The National Pipe Bending Company, of New Haven, Conn., are supplying a large number of their National feed-water heaters for electric light stations. Among those recently delivered are: One 800 horse-power heater to Edison Illuminating Company, Detroit, Mich.; two 400 h. p. to Edison Illuminating Company, Rochester, N. Y.; one 400 h. p. to Electric Light Company, Chambersburg, Pa.; one 300 h. p. to Plainfield Electric Light Company, Plainfield, N. J.; one 300 h. p. to Electric Light Company, New Haven, Conn.; one 200 h. p. to Electric Light Company, Norwich, Conn.; one 300 h. p. to Electric Light Company, Atlantic City, N. J.; one 80 h. p. to Electric Light Company, Middletown, Conn.; one 150 h. p. heater to Cushman Company for electric plant, Auburn, Me.

A Handsome Catalogue.—If the beauty and style of the descriptive catalogues of the Southwark Foundry & Machine Company, of Philadelphia, Pa., are any indication of the quality of its products, then surely the latter must be the embodiment of perfection. It is rarely that we find such elegant examples of the printer's art given to the description of machinery, and in this case there is no doubt but that the efforts have been worthily bestowed. The general illustrated catalogue of the various kinds of machinery built by the company contains a full description of the famous Porter-Allen engine, the pioneer in its field. The Southwark high-speed engine, also manufactured by this company in various sizes from 20 to 110 h. p., is fully illustrated. Besides these, the catalogue gives full information of the various products of the works, including the Clerk gas engines, pumps, pumping machinery, hydraulic presses, blowing engines, sugar machinery, etc. A separate brochure, accompanying the former, has for its contents an admirable treatise on the Porter-Allen steam engine. It need only be said that it is the work of Mr. Chas. T. Porter to convey the fact that it is a skillful *exposé* of modern steam-engineering practice, with special reference to the engine under discussion.

Magnetism in Watches.—

THE UNITED STATES ELECTRIC LIGHTING CO.

C. C. WARREN, 216 *La Salle Street*,
Manager Western Department.

CHICAGO, Feb. 10, 1885.

Messrs. Giles, Bro. & Co.:

GENTLEMEN: I have now been carrying my watch encased in one of your Anti-Magnetic Shields for about a year, and it affords me pleasure to state to you that notwithstanding I have been very much about dynamo-electric machines during the time named, the anti-magnetic case seems to protect the watch perfectly from the magnetic influence of the machines. I have not made any special electrical tests, inasmuch as I regard the good running of the watch as all that is necessary. I am thoroughly convinced, from the effect upon my own watch, that the case is an excellent protection, and I may almost add an absolute preventive of magnetic influence from external sources to the delicate movements of a watch. My watch is a Howard watch, and during the period of two or three years previous to encasing it with your anti-magnetic case it had varied to a very great extent, and I had it demagnetized on two different occasions. I regard your case as a complete success, and if my indorsement of same is of any value, you are at liberty to use it.

Yours truly,

C. C. WARREN, *Manager Western Dept.,*
The U. S. Electric Lighting Co.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED SEPT. 21, 1886.

349,312. Telephonic Circuit; Wm. Marshall, New York, N. Y. For illustrated description see page 174, this issue.

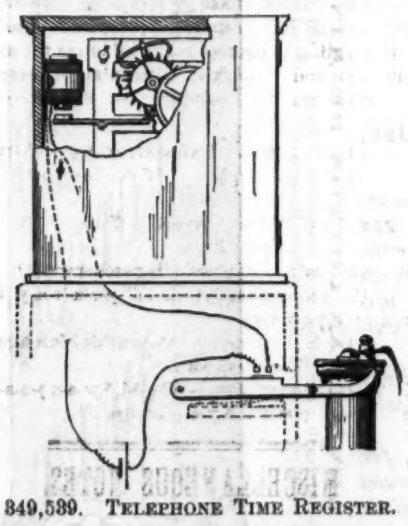
349,380. Electric Battery; Ern. Bazin, Paris, France. The carbons are continually rotated so as to avoid polarization. For illustrated description, see THE ELECTRICAL WORLD, Aug. 22, 1885.

349,392. Electric Motor and Generator; Wm. Hansell, Nevada, Iowa. The object of the invention is to provide an electric motor or generator with interchangeable field-magnets for the purpose of demonstration in schools, for medical use, and for other purposes requiring or employing electric currents of different kinds and qualities.

(1) 349,397. Coupling for Electrical Wires; (2) 349,398. Coupling for Electrical Wires; John A. Lantz, Pittsburgh, Pa. (1) The coupling consists of a metallic tubular socket divided lengthwise into separate parts inclosing and in electrical contact with the ends of the wires, and devices for connecting the parts of the coupling and clamping them to the wires. (2) The coupling, which is designed to connect a branch wire with a line wire, consists of an angular socket made in separable parts which inclose the wires and are clamped to them.

349,422. Magnetic Separator; C. O. Bartlett, Cleveland, O. Consists in arranging permanent magnets side by side.

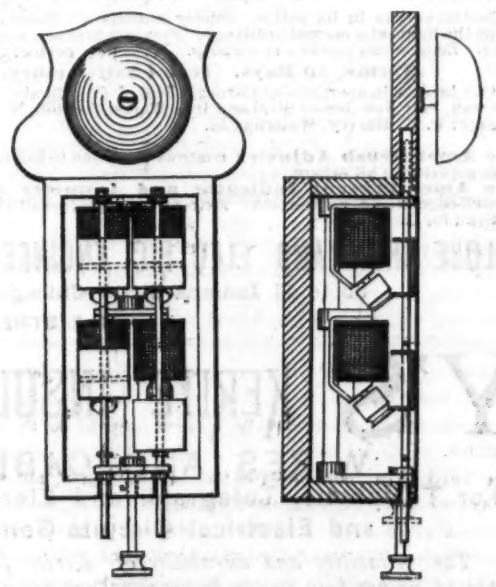
349,472. Underground Conduits; J. C. Anderson, Highland Park, Ill. The invention consists in making the sections



349,589. TELEPHONE TIME REGISTER.

of a series of thin perforated discs of dry clay-powder under great pressure. The discs are grooved, placed together in a kiln in suitable lengths, and a vitriable substance placed between each tile. Upon burning, the vitriable substance fuses and cements the whole into one solid length. See illustration.

349,493. Electro-Mechanical Synchronizer for Clocks; J. H. Gerry, New York, Assignor to M. E. Hunter, Oakland, Cal. The invention relates to the class of apparatus employed for periodically placing the hands of clocks, whether mechanically or electrically operated, in position to indicate true time and to correct for any deviation therefrom. The object of the invention is to provide means whereby an electric current transmitted at the proper moment shall set in operation mechanical devices which move the hands into the proper positions through a force which is in no way dependent upon the strength of the electric current and to immediately remove the setting devices from the path of the hands.



349,579. ELECTRIC ANNUNCIATOR.

349,516. Electrolier; C. G. Perkins, New York, N. Y., Assignor to the Imperial Electric Light Company, same place. This is an electrolier designed as a "drop-light." It consists of metallic tubes which telescope into each other.

349,533. Electric Gas Burner; A. T. Smith, New York, N. Y. The invention consists of a novel construction of the insulated burner which is mounted on papier maché.

349,539. Telephone Time Register; Joseph T. Tabony, New Orleans, La., Assignor of one-half to Atwood Violett, same place. The invention consists in combining a suitable time-keeper with the devices belonging to a local telephone system, the time-keeper being so arranged that it will only keep time and move its indices over a suitable dial when the transmitter is in use or the local station is in communication with the main line of the exchange system. The time-keeper is held in an inactive state by means of a detent-lever engaging therewith, and the lever is released to start the time-keeper by means of an electro-magnet included in the circuit of a local battery. In this manner exact time is kept of the length of telephonic communication. [See illustration.]

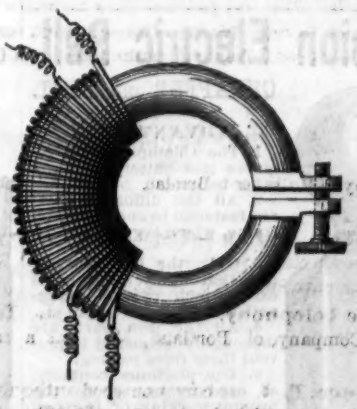
349,563. Electric Motor; Aug. Bossard, New York, N. Y. The invention consists in a novel construction of a motor of that class wherein a rotary armature provided with radial wings or spokes of magnetic metal is arranged to revolve within the influence of a series of electro-magnets surrounding the armature-shaft, and in circuit with the sections of a commutator, which directs the energizing-current from one magnet or set of magnets to another successively.

349,572. Manufacture of Incandescents; Robert Dick, Glasgow, Scotland. For description see page 174 this issue.

349,575 Telephone Receiver; L. S. Fairbanks, Boston, Mass. This is a telephone receiver designed so as to obviate the effects of induction currents. It consists of a "horse-shoe" magnet of peculiar form combined with a bar magnet having a polar extension of soft iron. The poles of both magnets act upon the diaphragm.

(1) 349,579, (2) 349,580. Electric Annunciator; John Geary, Philadelphia, Pa., Assignor of one half of (1) to T. E. Shaw, same place. (1) The invention consists in providing the magnet core with a projecting pin of diamagnetic material, upon which rests an armature. The armature is raised when the current energizes the electro-magnet and so drops the shutters. [See illustration.] (2) Consists of a rod which forms a guide for the falling drops, and by which they can be raised and replaced.

349,600. Galvanic Battery; C. E. Piper, Moline, Ill. The battery consists, first, in a cell consisting of a positive and a negative plate cemented to a strip of insulating material which lies between them at or near the edges of three sides thereof, thereby forming a receptacle between them for retaining the electrolyte; second, in an electrolyte consisting of mercuric nitrate, either alone or combined with another nitrate to form



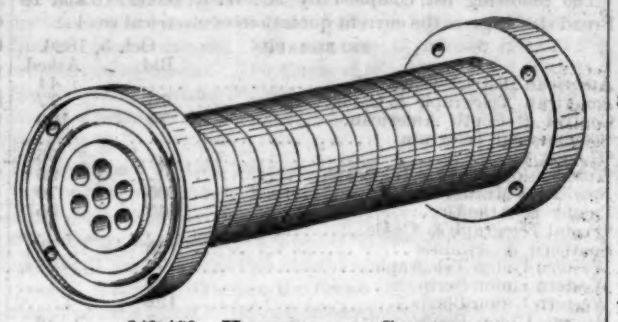
349,611. INDUCTION COIL.

a non-deliquescent salt; third, in the combination of a battery cell as above described, combined with a fibrous slip having deposited thereon the electrolyte.

(1) 349,611, (2) 349,612, Induction Coil; (3) 349,613, (4) 349,614, Automatic Cut-Out for Electric Light Circuits; (5) 349,615, Electric Generator; (6)

349,616, (7) 349,617, Induction Coil; William Stanley, Jr., Great Barrington, Mass., Assignor to George Westinghouse, Jr., Pittsburg, Pa.

(1). The invention consists in giving to the core of the coils an annular form, the ends confronting each other, but separated by a small space, as illustrated. The extent of this separation is rendered variable by means of an adjusting-screw of non-magnetic material acting upon the respective ends, so as to cause them to approximate or recede from each other, as desired. By varying the distance between the ends of the core, and thus varying the electromotive force of the secondary, the intensity of the lights may be easily and conveniently modified, and the brilliancy of illumination in different lamps may thus be rendered uniform. (2). The invention consists in constructing the core of the induction coil, or "secondary generator" of a series of sheets of iron stamped out with interior and external teeth, in which the wire is wound. The sheets are separated by insulating substance. (3) and (4). Both relate to devices for normally completing the circuit connection from the source of electricity and the primary coil of the "converter," through an automatic circuit-interrupting device which is capable of being operated to sever such connections through the instrumentality of a releasing device included in the secondary circuit of the inductorium. This device is not affected by currents of the strength which are normally designed to traverse the secondary circuit, but will be acted upon by currents of abnormal strength to operate the circuit-interrupting device, and thereby release a movable arm from a detent, the action of which is to sever the connections of the primary circuit. (5). The invention consists



349,472. Underground Conduit.

of the novel and simple construction of an alternating current machine. (6) and (7). Consists of novel methods of constructing secondary generators or converters.

349,650. Electric Synchronizer for Clocks; M. E. Hunter, Oakland, Cal., and J. H. Gerry, Brooklyn, N. Y., said Gerry Assignor to said Hunter. The object of the invention is to provide means whereby an electric current transmitted at the proper moment shall cause two hand-setting devices—one for the minute and the other for the second hand of a clock—to be operated, and to provide means for preventing the operation of such devices at other than the predetermined times.

349,654. Electric Motor; V. E. Keegan, Boston, Mass. The invention consists in the peculiar construction of the pole ends of the field-magnet cores, which face each other on a parallel line, and the arrangement of one or more double electro-magnet armatures to rotate on a line parallel and common with the axis of the pole-cores of the field-magnet, so that the armature simultaneously moves by attraction and repulsion from its present position to one before the peculiarly-constructed pole. The object of this is to make one field-magnet equivalent to a number of separate magnets, while in reality but one magnet is used, whose poles are crowned.

Copies of the specifications and drawings complete of any of the patents mentioned in this record—or of any other patent issued since 1866—can be had from this office for 25 cents. Give the date and number of patent desired, and address Johnston's Patent Agency, Potter Building, New York.

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Hollow Base Switch, Walnut, etc., per 100.	20.00	Novelty Disque Battery Zincs (the best), per 100.....	50.00
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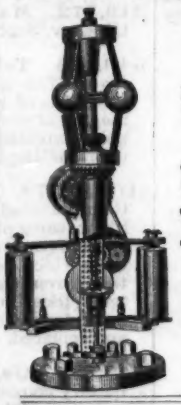

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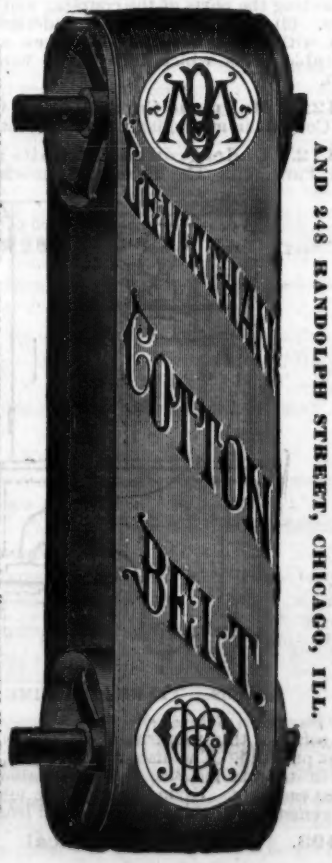

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